RAILROAD GAZETTE

FRIDAY, DECEMBER 3, 1897.

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Contributions.

Belgian Expresses—A Correction.

LONDON, NOV. 17, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In an interesting article on the above subject in your issue of Nov. 5, on page 787, Mr. J. P. Pattinson says: "Again, the estimate made a few years ago in Foxwell and Farrer's 'Express Trains, English and Foreign,' only dealt with the services radiating from Brussels to a few of the chief towns, thus omitting all the express mileage not found on their few selected main routes." This is not correct, as Mr. Pattison may see by looking at page 166 of our book. We took *every run* that attained 29 miles per hour, including stops, that we could find in Belgium in the summer public timetables of 1888; not merely selected trains from Brussels. We found in 1888 that the total express mileage, thus reckoned, in Belgium was 6,919 miles per day at an average inclusive speed of 31¾ miles per hour. Mr. Pattinson, in 1897, finds that there are only 5,056 miles per day, but he takes his minimum speed for an "express" as 35 miles per hour or 6 miles quicker than our standard.

It would, I think, be convenient if some recognized standard of "express" could be adopted by those dealing with this subject, so that a basis for comparison might be obtained at various periods. We only adopted 29 miles per hour as our "express" standard on the continent of Europe, because that speed appeared in 1888 to be the general standard for European express trains.

T. C. FARRER.

The Education for a Railroad Career.

NEW YORK, NOV. 15, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I am 29 years of age, and am in the railroad business. I have filled the position of stenographer, secretary or chief clerk in nearly all departments of the service with some of the larger roads. At present I am secretary to the president of a Western line. I prefer the operating department. I do not get much practical railroad experience in my present position, especially in the operating departments, and as I am a student in railroading, I write you, thinking perhaps you, or some of your readers, can suggest a course of study for a young man in my position which would best fit a man to handle matters pertaining to the operation of a railroad. I would like to have your views on a regular course of study to be followed during leisure hours to fit myself for the future, in any position that I might be called on to fill, and I have no doubt but this matter would be of interest to a great many young men who are ambitious.

E. E. H.

Elasticity of Cars and Tracks.

NEW YORK, NOV. 26.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The heavier sections of rail have now been in use long enough to display to any observer the points of superiority to the lighter sections, which they undoubtedly possess. However, I believe that many observers, as well as myself, have noticed in riding over track laid with heavy rails an absence of the impression that one is sliding over wet snow. The softness of track laid on similar substructure with lighter sections of rail seems to have congealed a little with the firmer support, and trifling irregularities of rail surface and car wheels seem to announce themselves with a greater degree of insistence.

Of course I am considering track in the best attainable condition, the difference being only in the weight or rather the stiffness of the rail. Up to a small degree of permanent depression at joints, whether such depressions are by reason of worn rail ends or bent angle plates, the difference in degree of softness of track seems to be noticeable.

Granting that the modern track has secured a greater degree of stability and economy of maintenance at the sacrifice of some degree of resilience, can that loss of resilience be restored between the rail and the anatomy of the passenger by changes in the car wheel or the car springs? Is it not worth a struggle on the part of the expert car builders to secure by arrangement of levers or otherwise such a combination of springs as shall secure a known and a uniform measure of elasticity for a coach under all conditions of loading?

CHIEF ENGINEER.

The Technical and Practical in Book Reviewing.

SHARPSVILLE, PA., NOV. 15.

TO THE EDITOR OE THE RAILROAD GAZETTE:

Your issue of Nov. 5 contains a criticism on "Metallurgy of Cast Iron" which in sense says that its author knows little about cast iron, and that most of the statements are not in accord with the facts and many of them are ridiculous. It is not long ago that another reviewer in one of our leading mechanical papers also thought certain statements were ridiculous, but discussion of the subjects criticised made it evident to many that the ridiculousness, if there was such, lay with the reviewer.

The work will average about 10 statements per page; crediting the book with 500 pages, gives 5,000 statements that a reader of your reviewer's criticisms must draw the conclusions are mostly in error and many of them ridiculous.

As your reviewer seems to think that he has a duty to perform in shielding the public from being misinformed, I would suggest that instead of his merely making a few unjust sweeping statements, condemning the whole work as he has done, to commence at the beginning of the work and go through it describing how and in what manner statements are wrong and ridiculous, and give what he claims as correct. I would discuss his selections until the end, and leave your readers to judge how many of the 5,000 statements are so erroneously in error as to call forth the comments condemning the work he has given. The first edition of any new work is bound to contain some error in statements that could be misconstructed to make them appear ridiculous; but there are many who differ with your reviewer's conclusions, as I could prove by complimentary reviews and letters I hold praising the value of my work.

I may know little about cast iron, but can your reviewer name and support another man in this country or in Europe that has excelled the writer in advancing original and common-sense knowledge on matters relating to cast iron, practical for every day use, and that has given out more information that might have been retained for pecuniary purposes. I am not writing this in an egotistical or boastful spirit, but from a sense of injustice, at the hands of a few, who, possessing more technical than practical knowledge of furnacing and founding, have failed to perceive that what few molehills of technical errors their imagination has made mountains of are flooded to an invisible depth by the elements that are a real benefit and guide to the achievements of economy and desired results in the purchasing, mixing, melting, testing and use of cast iron.

THOS. D. WEST.

Proposed Bridges Across the Chicago Drainage Channel.

[WITH AN INSET.]

A very interesting part of the work in connection with the completion of the Chicago Drainage Canal is the bridging of the channel with a variety of swing bridges to accommodate the crossings of railroads and highways. The accompanying table shows what bridges are required across the main channel and the river diversion channel of the Des Plaines River, and gives in a concise way such general information as is now available. Where omissions occur in the table the meaning is that the plans are not yet fully matured for those structures and therefore nothing definite can be given about them.

In all, fifteen bridges are to be built by the Sanitary District in connection with its Main Channel, involving an expenditure of about $1,500,000. These 15 bridges include: Five double-track railroad swing bridges; two double-track railroad fixed spans; one railroad swing bridge with two or more tracks, the design not yet decided upon; and one eight-track railroad swing bridge. In addition to these nine railroad bridges there will be six highway swing bridges required. The six fixed spans under construction are for the crossing of the Atchison, Topeka & Santa Fe over the new channel cut for the diversion of the Des Plaines River. These spans were contracted for by the Atchison, Topeka & Santa Fe, under its own specifications, but one-half of the cost is to be paid by the Sanitary District.

In addition to these 15 bridges there will be a number of new bridges required for the Chicago River in view of the changes proposed in the channel of that stream, and several spans will have to be built across the Des Plaines River between Lockport, the present terminus of the canal proper, and the lower end of Joliet.

A special department was created by the trustees of the Sanitary District for preparing designs, estimates and specifications for the bridges to be built. Mr. W. M. Hughes, M. Am. Soc. C. E., was retained as consulting engineer, and under his direction all of the designs and specifications have been prepared. He has been assisted by Mr. Edward William, C. E., who has had immediate charge of the computers and draftsmen.

We present herewith several drawings showing general and special features of the bridge for the Chicago, Madison & Northern Railroad Company's crossing of the channel. This bridge is representative of the type of design adopted for all of these structures.

Fig. 1 is a cross-section of the foundations for this bridge, the span of which, owing to the fact that when closed its axis makes an angle of 36 deg. 4½ min. with the center line of the main channel, is nearly one third longer than is required for the bridges crossing at right angles. It will be noted in extracts taken from the specifications for the substructures of these bridges, which follow, that a provision is inserted under the heading of "workmen" regarding an eight-hour day.

Figs. 2 and 2a are taken from the strain sheet for the Chicago, Madison & Northern bridge and shows the magnitude of the stresses resulting from the loading adopted. This figure and the accompanying table are self-explanatory. Considerable thought has been given to the general appearances of these bridges, with the result that the elevations present pleasing outlines.

Fig. 3 shows the general details of the main post $U_9 L_9$. Here, as in the succeeding figures, one is impressed with the great solidity of the structure and the care with which all of the details have been worked out.

Fig. 4 shows the device adopted for raising the ends of the span by means of compressed air. It is not proposed to equip these bridges with any machinery at this time, nor until the Drainage Canal becomes a navigable waterway, but they are being so designed that it will be a comparatively simple matter to put the machinery necessary to operate them in place when required. In this connection it may be said that the first plans proposed for these bridges contemplated the building of so-called temporary fixed spans, and bids were called for on that basis for the Southwest Boulevard bridge, and the contracts let. Considerable opposition to fixed bridges was raised in the State Legislature by the representatives of the Illinois River valley on the ground that they had all along supported the project in the interests of an improved waterway for their section. Upon a careful comparison of estimated costs it was found that the additional cost of swing bridges over fixed spans was such that it was truer economy to build the swing bridges, not equipping them with operating machinery for the present, nor until the channel may become a navigable waterway.

Fig. 5 shows the design of the loading beam for the C., M. & N. bridge. Especial attention is called to the manner of supporting the span upon the drum. By referring back to the plan in Fig. 2 it will be noticed that there are two transverse loading beams passing over the drum, on the extremities of which rest the points L_9 of the trusses. By this arrangement the drum can be less in diameter than the width of the span, and hence a saving is effected in the size of the pivot pier. These loading beams, being cantilevers and supporting such great loads, are necessarily very massive, as will be seen from the drawing, Fig. 5.

Fig. 6 shows the general design and principal details of the drum. The loading beams are carried upon the four so-called "chord beams," and in such a manner as to overcome any tendency of the shell of the drum to deflect toward, or away from, the center. The bracing is so designed that the weight transmitted by means of the loading beams to the drum is distributed to all of the bearing wheels equally. The "chord beams" are designed to have no measurable deflection under maximum loading.

One of the novel features of the design is the manner of bedding the segmental casting under the track of the drum. In the extracts from the specifications for the superstructure which follow will be noticed a clause relating to "cement filling for turn-table tracks." After the track has been carefully brought to a true level by wedges, this "cement filling" is melted and run into the space left beneath the track. By this means it is expected that a perfectly solid bearing will be secured capable of resisting a much greater pressure per square inch than will ever come upon it.

We are indebted to Mr. Isham Randolph, Chief Engineer of the Sanitary District, for permission to present the accompanying drawings, and to Mr. T. T. Johnston, Assistant Chief Engineer, and to Mr. Edward Willman, Assistant Engineer, for general information regarding these bridges.

The following extracts taken from the specifications for these bridges show that strictly high-class work is called for on these structures:

EXTRACTS FROM SPECIFICATIONS FOR SUPERSTRUCTURE.

Wrought Iron.

All iron used for rivets shall have an ultimate tensile strength of not less than 48,000 pounds per square inch, an elastic limit of at least 26,000 pounds per square inch, and an elongation of at least twenty (20) per cent. in eight (8) inches, and be so ductile that when bent cold through 180 degrees, and hammered down flat on itself, it shall show no sign of fracture on convex side of curve.

Steel.

All steel shall be uniform in quality and made by the open-hearth process.

Tests shall be made upon pieces cut from the finished material and shall be not less than one-half (½) square inch in sec-

tional area. Two pieces, one for tensile test and one for bending test, shall be furnished for each blow or cast, and so selected that each heat or furnace full of billets, blooms or slabs shall be represented by at least one test to prove the condition of the metal after re heating, rolling, etc.

Medium steel shall have an ultimate tensile strength of from 60,000 to 68,000 pounds per square inch, an elastic limit of not less than 36,000 pounds per square inch, shall elongate not less than twenty-five (25) per cent. in eight (8) inches, and show a reduction of area at point of fracture of not less than forty (40) per cent.

The test piece must also bend cold 180 degrees around a curve whose diameter is equal to the thickness of the piece without crack or flaw on convex side of bend.

A hole punched for a three-quarter (¾) inch rivet, one and one-half (1½) inches from the edge of plate, shall be capable of being enlarged by drifting to one and one-eighth (1⅛) inches in diameter without sign of fracture.

Full-sized steel eye bars, when tested to destruction, must show an ultimate strenth of at least 56,000 pounds per square inch, an elastic limit of not less than 30,000 pounds per square inch, and shall elongate twenty-five (25) per cent. in a gaged length of twelve (12) inches at the point of fracture and fifteen (15) per cent. in ten feet of bar and a reduction of area at fracture of at least fifteen (15) per cent.

For steel pins the elongation may be five (5) per cent. less and the reduction at point of fracture may be ten (10) per cent. less than specified.

Soft steel shall have an ultimate tensile strength of from 52,000 to 60,000 pounds per square inch, an elastic limit of not less than 30,000 pounds per square inch, and shall elongate not less than twenty-five (25) per cent in eight (8) inches, and show a reduction in area at point of fracture of not less than fifty (50) per cent., except in web plates over thirty-six (36) inches wide, when the elongation will be reduced to twenty (20) per cent., and the reduction of area to forty (40) per cent. It must also bend cold through 180 degrees and close down upon itself without showing sign of fracture on convex side of bend. A hole punched for three-quarter (¾) inch rivet, and one and one-half (1½) inches from the edge of plate shall be capable of being enlarged by drifting to one and one-half (1½) inches in diameter without sign of fracture.

Rivet steel shall have an ultimate strength of 50,000 to 58,000 pounds and an elastic limit not less than fifty-five (55) per cent. of the ultimate; an elongation of not less than twenty-seven (27) per cent. and must bend 180 degrees flat on itself without sign of fracture on the convex side of the bend.

Specimens taken from all grades of steel, after being heated to a light cherry red (as seen in the dark), and quenched in water of 82 deg. Fahr., must conform to the bending requirements above.

Phosphorus must not exceed eight one-hundredths (0.08) per cent. for acid steel, or six one-hundredths (0.06) per cent. for basic steel.

No steel which proves brittle shall be used under any circumstances; if it develops this character at any stage of its manufacture, it shall be at once condemned and other material used. The object of the more particular clauses, hereto relating, being to guard against the possibility of the use of this class of metal.

All steel castings shall have an ultimate strength of not less than sixty-two thousand five hundred (62,500) pounds per square inch, an elastic limit of not less than thirty thousand (30,000) pounds per square inch, shall elongate not less than fifteen (15 per cent. in eight (8) inches, and show a reduction at point of fracture of not less than twenty (20) per cent. The amount of phosphorus contained shall not exceed eight one-hundredths (0.08) per cent. All steel castings shall be sound and free from blow holes and roughness, sponginess, pitting, shrinkage-cracks and other cracks, cavities, etc., and shall be thoroughly annealed according to the best practice. Each cast shall be so made that sufficient number of test pieces can be cut as to enable the engineer or inspector to satisfy himself of its quality.

Phosphor bronze shall be of the best quality for the purpose for which it is to be used. The castings shall contain eighty-eight (88) per cent. of copper and twelve (12) per cent. of phosphorized tin. The phosphorized tin to contain five (5) per cent. phosphorus. Upon each casting shall be cast suitable test pieces which, in breaking, must show a good uniform metal, and when broken in testing machine shall show at least forty thousand (40,000) pounds ultimate tensile strength.

Cement filling for turntable tracks shall be made of eighty (80) per cent. brimstone, five (5) per cent. asphaltum and fifteen (15) per cent. bituminous limestone (by weight). These quantities shall be placed in a heating vessel at the same time and heated up to a temperature of three hundred (300) degrees Fahrenheit for about thirty (30) minutes. The temperature shall be reduced to about two hundred and fifty (250) degrees in order to let the heavy foam settle, after which the material shall be run into molds for cooling off. This material shall be remelted without foaming and run under the tracks in such manner as to insure the filling of all the voids.

The material used in this composition shall be as follows:

Brimstone—commercial, unmixed (seconds). Asphalt containing ninety-three (93) per cent. of asphaltic bitumen, mined and refined by the Standard Asphalt Co., California (refined solid). Bituminous limestone (Wasatsh) mined in Utah and pulverized to cyclone size by the Assyrian Asphalt Co.

Asphaltic Paint.—All masonry bolts imbedded in abovementioned cement filling shall be coated with a composition made as follows:

To forty-five (45) per cent. melted asphalt, add fifty-five (55) per cent. pulverized green limestone which has previously been heated up to four hundred (400) degrees. This to be thoroughly mixed at a temperature of three hundred and fifty (350) degrees. Run this into molds to cool off. Re-melt this material and coat the bolts and the bottom of the base casting as well as the cement filling of the same. After the track is set, all edges of the casting coming in contact with the cement filling under the turn-table tracks shall also be given a coat of the same paint.

Details of Construction.

All heads of eye bars shall be formed by upsetting on the solid bar, or by a process approved by the engineer. Upsets shall be free from folds. Heads shall be clean, full-sized forgings, formed centrally on the bar in true line and out of wind, and shall be free from lateral fissures, incipient cracks or flaws of any kind. In upsetting steel bars or rods, sharp angles must be avoided where the upset joins the bar.

All steel tension members which have been heated shall, after work on them is completed, be thoroughly annealed by heating them uniformly to a cherry-red heat, and allowing them to cool slowly.

After the splice plates are riveted on in the shops, each line of chords shall be assembled, the joints matched, their abutting surfaces brought to a tight fit by use of clamps, and all the rivet holes in the ends of chords and splices shall be reamed to an exact match and fit. Match marks shall then be made in each piece.

All riveted work in medium steel shall be reamed in accordance with the usual practice.

No riveted work in soft steel shall be reamed except the connection for stringers and floor beams, and for posts and floor beams. These must be accurately matched and reamed to fit before leaving the shop.

All splice plates in which the holes are mismatched, either in the plates themselves or with the adjoining chord or flange, shall be matched and the holes reamed to fit before leaving the shop.

No inaccurate or otherwise defective work will be accepted under any circumstances in connection joints or riveted work.

The riveted field connections of floor beams, stringers, posts and struts must be accurately matched before leaving the shops, and all unmatched holes reamed to fit; the ends of floor beams and stringers must be machine faced to exact lengths.

Whenever practicable, rivets must be machine-driven.

In riveted steel work the punch hole shall be one-eighth (⅛) inch less than size required, and shall then be reamed to fit.

Turntable, Etc.

The base casting shall be of cast iron. The center casting shall be of cast iron turned down to receive the cast-steel spider and steel plates connecting with radial roller arms. It shall be the true center for the track drum and pitch circle.

The rack circle shall be of cast steel, in sections, milled to exact lengths. The rack shall be tool finished and secured to base castings with bolts as shown on drawings. The pitch shall be as given on plans, and the pitch line shall be absolutely true.

The upper and lower track shall be of cast steel tool finished on upper and lower side and set perfectly level and well secured in place by bolts as shown on plans.

Rollers shall be made of cast steel. They shall be of uniform size and true bevel and held in place by two channel rims. Outside they shall bear against faced and bored phosphor bronze washers. Each journal shall have proper provision for oiling.

The drum shall be built to a true circle and care shall be taken to have the lower edge of web plate at all points to bear against the track. Flanges of bottom angles shall have a uniform bearing against the track and stiffeners to fit tightly to flanges. The drum shall be held in place and form by radial struts abutting against a cast-steel spider with phosphor bronze bushing.

Raising of Ends.—The difference of elevation at the ends of the bridges when closed and open, shall have the same ratio to the actual figured total deflection of ends as the ratio given on strain sheets between amount of ends raised and assumed total deflection. The difference between the total deflection and the amount that the ends are raised shall be taken out by shortening the eye bars in top chords in the two panels next to center tower.

Camber.—The bridges shall be given a camber not less than the deflection under extreme loads.

EXTRACTS FROM THE SPECIFICATIONS FOR MASONRY.

Stone.—The stone used for the P., C., C. & St. L. Ry. Co., the C. & N. P. R. R. and the U. S. Y. & T. Co.'s bridge shall be Pontoosiac, Anamosa, Bedford or an equally good stone. Stone used for Kedzie avenue bridge shall be Bedford stone and Sanitary District building stone, as shown on plans. The quality shall be subject to the approval of the Chief Engineer. The Sanitary District building stone mentioned is owned by the Sanitary District and piled on its property near the east end of Contract Section 7.

Cement.—The best Portland and natural cements shall be used on this work, brand and quality to be subject to the approval of the Chief Engineer. The weight per cubic foot of Portland cement shall be not less than one hundred (100) pounds and for natural cement shall be not less than sixty-seven (67) pounds. The development of tensile strength for Portland cement shall be not less than four hundred (400) pounds per square inch, and for natural cement not less than one hundred (100) pounds per square inch, after being exposed one (1) day in air and six (6) days in water. All lumpy, dirty or damaged cement shall be rejected; also damaged or short weight packages.

Portland Cement.—Concrete shall be made in the proportion of one (1) part of cement, three (3) parts of sand and six (6) parts of broken stone. It shall be mixed by machinery, if so directed by the Engineer: on being placed, the concrete shall have a wetness such as to permit quaking or mobility likened to liver. The stone shall be of a quality approved by the engineer, broken into angular pieces of a size small enough to pass through a ring two (2) inches in diameter, and be entirely free from foreign substance. The stone must be thoroughly drenched with clear water before mixing with the mortar. The concrete is to be deposited in layers not exceeding six (6) inches in thickness, as directed by the Engineer, and to be thoroughly tamped or rammed.

Natural Cement.—Concrete shall be made in the same manner as specified above for Portland cement concrete, except that the proportion shall be one (1) part cement, two and one-half (2½) parts sand and five (5) parts broken stone.

Masonry.—All masonry shall consist of pitched draft, rock-faced work built in regular courses, no course to be less than twelve (12) or more than thirty (30) inches in vertical height, and in no case shall a course overlie one of less thickness.

Masonry shall not be laid in freezing weather without written permission from the Chief Engineer. Any masonry so laid in freezing weather shall have joints raked out and pointed in the spring at the expense of the contractor. Should masonry be laid in freezing weather, the stone shall be sufficiently warmed to remove all ice from the surface, and the mortar mixed with brine.

Workmen.—The contractor shall employ competent foremen and laborers, and shall discharge, at the request of the Engineer, any incompetent or unfaithful men in his employ. None but men expert in their respective branches of work will be employed where special skill is required, and in the employment of men preference shall be given to union laborers.

It is especially understood and agreed that eight (8) hours shall constitute a day's work, and no workman shall be employed or required to work more than eight (8) hours out of any twenty-four (24) hours, and no work in excess of that time shall be allowed.

In the event of any violation of the above eight (8) hour provision it is agreed hereby that the said District shall, and that it is duly authorized to, retain from any money due or to become due at any time from it to the second party, as liquidated damages, the sum of five ($5) dollars per hour for each hour that any employee shall be required to work in excess of eight (8) hours per day, pursuant to the terms and conditions of the ordinance adopted June 23, 1897, attached hereto.

LIST OF SWING BRIDGES PROPOSED TO CROSS THE MAIN DRAINAGE CHANNEL OF THE CHICAGO SANITARY DISTRICT.

Name of structure.	Location.	Span.	Railroad or highway.	Diam. of drum.	Substructure.		Superstructure.	
					Bids opened.	Contract let to.	Bids opened.	Contracts let to.
		Feet.		Feet.				
1. Southwest Boulevard	Section O	313	Highway	40	Sept. 15, 1897	Benezette Williams	Sept. 15, 1897	J. G. Wagner Co.
2. P., C., C. & St. L. Ry.; Chi. & Nor. Pac. Ry.; U. S. Y. & T. Co.*	" O	416	8 tracks	79	Dec. 22, 1897		Dec. 22, 1897	
3. Chi., Mad. & Nor. Ry	" N	474	2 "	28	Sept. 8, 1897	McArthur Bros. & Winston Co.	Nov. 3, 1897	Toledo Bridge Co.
4. Kedzie avenue	" N	320	Highway	28	Nov. 3, 1897			
5. A., T. & S. F. Ry	Between section M and N	323	2 tracks	28	Sept. 8, 1897	McArthur Bros. & Winston Co.	Dec. 22, 1897	
6. Chi. & West Ind. Belt Ry	" " K " L							
7. A., T. & S. F. Ry	Section G	368	2 tracks	28	Sept. 8, 1897	McArthur Bros. & Winston Co.	Dec. 22, 1897	
8. Summit	" F		Highway					
9. Chi. Term. Trans. Ry	Between section D and E	312	2 tracks	28	Sept. 8, 1897	McArthur Bros. & Winston Co.	Nov. 3, 1897	Wisconsin Bridge & Iron Co.
10. Willow Springs	Section I		Highway					
11. A., T. & S. F. Ry	" 8		2 tracks					
12. Lemont	" 8		Highway					
13. Romeo	" 12		"					

FIXED SPANS OVER DES PLAINES RIVER DIVERSION.

14. A., T. & S. F. Ry. at Summit, 6, 52 ft. spans, plate girders; contracts let by A., T. & S. F. Ry. Co.; substructure to Ft. Madison & Appanooso Stone Co.; superstructure to American Bridge Works.

15. A., T. & S. F. Ry at Lemont, 12, 60 ft. spans, plate girders.

*NOTE.—The tenders invited include the supplying of all materials for the erection and completion of this bridge, according to plans and specifications furnished by the Sanitary District of Chicago, unless a competitive plan submitted shall prove, in the opinion of the Chief Engineer of said District, more acceptable and economical. Competitive plans, accompanied by bids formed upon such plans, are solicited. Such plans must conform to the specifications furnished by the District as to strength and quality of materials and workmanship. All competitive plans must be accompanied by a certificate from the interested railroad that the design, if adopted by the District, will be acceptable to such railroad company.

Each bridge is treated as a single contract in canvassing proposals and making awards.

Following are the bids received Nov. 3, 1897, by Chicago Sanitary District.

FOR SUPERSTRUCTURE—CHICAGO TERMINAL TRANSFER RAILWAY CO.'S BRIDGE.

Bidders.	Lump sum.	Soft steel, cts. per lb.	Steel castings, cts. per lb.	Iron castings, cts. per lb.	Phosphor bronze, cts. per lb.
Wisconsin Bridge & Iron Co.	$98,877	2.75	4.5	3	25
Toledo Bridge Co.	31,974	2.7	4 5	2.5	25
King Bridge Co	34,700	3.4	5.5	3.4	25
American Bridge Works	34,725	3	4.5	3	25
A. J. Tullock Co.	34,871	2.75	5	3	20
Detroit Bridge & Iron Works	34,986	3	8	5	35
Pennsylvania Steel Co., Limited	35,775	3.5	6	3	44
Carnegie Steel Co., Limited	36,050	2.788	7.593	5.093	25.593
J. G. Wagner Co.	36,800	3.5	6	3	30
Youngstown Bridge Co	36,814	2.56	6.50	5	19.17
New Jersey Steel & Iron Co	37,967	3.8	5	3	25
Edge Moor Bridge Co	39,300	3	6	4	25

FOR SUPERSTRUCTURE—CHICAGO, MADISON & NORTHERN RAILWAY BRIDGE.

Bidders.	Lump sum.	Soft steel, cts. per lb.	Steel castings, cts. per lb.	Iron castings, cts. per lb.	Phosphor bronze, cts. per lb.
Toledo Bridge Co.	$71,164	2.1	4 5	2.5	25
Detroit Bridge & Iron Works	78,607	3	8	5	35
A. J. Tullock Co.	79,850	2.75	5	3	20
King Bridge Co.	80,300	3.4	5.5	3.4	25
Carnegie Steel Co., Limited	81,393	2.857	7.593	5 093	25.593
American Bridge Works	81,200	3	4.5	3	25
Pennsylvania Steel Co.	81,950	3.5	6	3	44
New Jersey Steel & Iron Co.	82,556	3.8	5	3	25
Youngstown Bridge Co.,	82,980	2.56	6.5	5	19.17
J. G. Wagner Co.	86,400	3 5	6	3	30
Edge Moor Bridge Co.	88,150	3	6	4	25

FOR SUBSTRUCTURE—KEDZIE AVENUE BRIDGE.

Bidders.	
Chicago Star Construction & Dredging Co.	$18,652
McArthur Bros. Co.	19,675
Ruddy Contracting Co	21,912
J. H. Esson	21,726
Campbell & Brown	21,809
Hayes Bros.	21,880

The International Association for Testing Materials.

A report from the committee to the Congress of the International Association for Testing Materials, held at Stockholm, Sweden, Aug. 23 to 25, was presented at the annual meeting of the American Society of Mechanical Engineers this week, and we are now at liberty to publish the following brief account of the Congress:

Prof. L. de Tetmajr, President, called the Congress to order in the Hall of the Knights, and in welcoming the members, 361 of whom had arrived, with about 75 ladies, remarked that the international character had been fully sustained by the great number of countries represented, and called attention to the fact that the principal duty of the present meeting would be the discussion of plans for permanent organization.

The Burgomaster of Stockholm tendered a hearty welcome on behalf of the Swedish people, and the President at once proceeded to business by submitting a part of the by-laws as drawn up by the Executive Commiteee. The matter first to be settled was the procedure to be followed during the sessions and the method of voting. It was decided unanimously that the method heretofore used at previous Congresses be adhered to, viz., that each member present should have but one vote.

Contrary to previous custom, the business of this Congress would be carried on in General as well as Sectional Meetings. Section I, relating to metals. Section II, natural and artificial building stone and their bond materials. Section III, other industrial materials.

It was announced that Mr. A. Carnot, Inspector-General of Mines of France, had presented a voluminous and most valuable work on "Chemical-Analytic Methods of Examinations of Iron," which would be fully reported in the official organ of the Association. Two other papers were received after the programmes had been printed. one by Prof. A. Retjo, of Buda-Pest, on "Internal Friction of Solids as an Absolute Property and the Formulæ Derived Therefrom Relating to Tension and Compression Diagrams," and one by Dr. W. Michaelis, of Berlin, on the "Process of Setting of Bond Materials Containing Lime." It was also announced that Prof. A. Wahlberg would present the paper on "The Development of Structural Materials and Methods of Testing Them, in Sweden," because of the sudden death of the Director of the Jernkontoret, Mr. Dellwick. It was announced that Prof. J. Wyckander and Chief Engineer Silversparre had, by order of the Jernkontoret, prepared a paper on "Tests of Resistance of Swedish Materials," from materials in its archives, which had been printed and dedicated to the Congress. This work contains, in a comprehensive and concise form, most valuable information on all the many investigations made by the Jernkonteret on Swedish iron and steel. It contains a comparison of records, heretofore only partially published, and is a valuable addition to the literature of steel.

Mr. F. Osmond read his paper on "Microscopy of Metals Considered as a Method of Test," illustrated by colored lantern slides. The author was rewarded with great applause for the admirable subject matter and the successful arrangements by which alone such a paper could be properly presented to an audience. The discussion was opened by Mr. Henning, of New York, who pointed out particularly that the methods will permit us to know the internal constitution of metals and their alloys, and will have, more than others, a fruitful influence on industry and technical sciences.

This paper by Mr. Osmond is of such importance that it will be well to point out its main points. Chemical analysis, although determining the quantity of component elements in a body, does not define the manner, system or arrangement of molecules. Metallography investigates the latter, and is divided into three divisions:

1. Determination of component parts, or Anatomical Metallography.
2. Determination of composition, form and dimensions of component parts, or Biological Metallography.
3. Study of defective treatment of the materials and effect of admixtures having special influence on quality and properties, or Pathological Metallography.

Color and light are pointed out as important characteristics in composition, as well as changes due to treatment in a certain manner. Under each of these heads the author gives notable instances showing muciographs of cement, steel, silver, forged steel, etched with NO^3H and H^2SO^4, alloys of gold and aluminum, and copper and silver; forged steel, annealed, and heated and quenched at given temperature: 11 per cent. SN bronzes cast in ingots; the same heated to oxidation, cooled in ingots, as well as in sand; the latter reheated to oxidation: the same quenched at red heat; alloys of An and Bi, treated variously similar to above, and many others. The remarkable and clearly defined results are beautifully shown, and although the author does not directly state that microscopy is a reliable method of test, he leaves upon his hearers or readers the well-defined impression that such is the conclusion to be drawn from his researches.

Before proceeding to the next business it was announced that the entire Council of the Iron and Steel Institute and other English metallurgists, 30 in all, had just been declared elected to membership in the Association.

The next subject taken up for discussion was the proposition: "Ways and Means Are to be Sought to Introduce Uniform Specification and Methods of Inspection of Iron and Steel of all Kinds." This was discussed by Mr. E. Schroedter, of Duesseldorf, and also in two important papers, one by Director Ast, of Vienna, the other by Engineer Barba, of Paris. The result of the discussion was the opinion that the result of the proposition was practicable and obtainable.

Dr. H. Weddiag, of Berlin, next addressed the Congress on "The Possibility of Establishing an International Sidero chemical Laboratory, viz., the thorough comparison and determination of degree of accuracy of current methods of analysis of iron, and enunciation of those which are to be used in case of dispute." He points out the purely scientific character of the proposed laboratory, and the exclusion of all technical-commercial control analyses for third parties. As $3,666 had already been subscribed, a beginning could be made with such laboratory, although it could not be equipped completely, or its continued existence assured.

Section I., Metals, was organized as follows: Hon. Presidents, Prof. Kick, Vienna, and Chief Building Councillor Wichert, Berlin; Chairman, Councillor V Borries, Hanover; Vice-Chairman, Messrs. Roussel, of Belgium, and Henning, of New York; Secretaries, Guerard, of Paris, and Schwerdt, of Munich. This section discussed in a thorough manner the propositions of an international sidero-chemical laboratory; of standard specifications for quality and inspection of iron and steel methods of determining extension of ductile materials; standard methods of testing rust-preventing coatings.

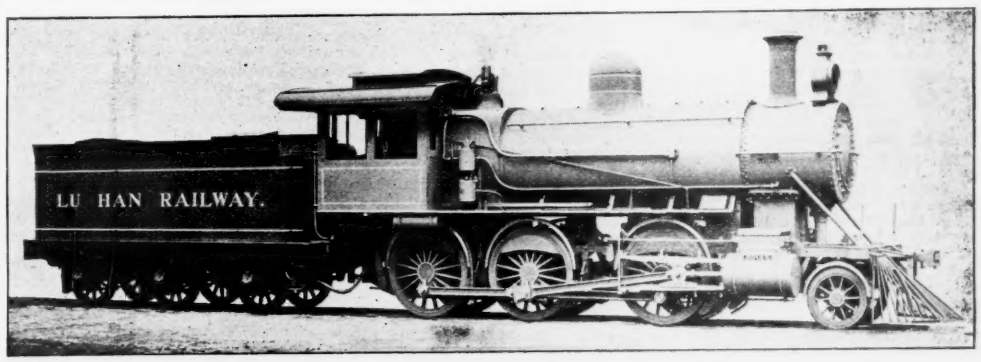
Section II., Stone and Bond Materials, was organized as follows: Hon. Presidents, General Chonlatschenko, St. Petersburg, and Engineer Segre, of the Adriatic Lines, Ancona; Chairman, Engineer Guerard, Chief Engineer, Port of Marseilles; Vice-Chairmen, H. H. Fleiner, Aarau, and Prof. A. Wahlberg, of Stockholm; Secretaries, Candlot, of Paris, and Professor Stenberg, of Christiania.

The subjects discussed were the following: "Study of the Relation of Chemical Composition and Weathering Qualities of Natural Building Stone"; Report on Pipe-Tests by Max Gary of Berlin; "On the Hardening Process of Calcareous Bond-Materials," by Dr. Michaelis, Berlin; "On the Determination of Quality of Hydro-Bond Materials," by Director Meyer, of Mahlstatt; "On Irregularities in the Time of Setting of a Cement," by Dr. Eurich, Carlstadt; "Contribution to the Solution of the Problem of the Standard Consistency of the Standard Mortar; Determination of These Conditions, by Which Approximately Similar Densities may be Obtained in Tension and Compression Samples," by Professor Tetmayer, of Zurich, and Engineer Greil, of Vienna.

After further discussion of the proposed by-laws, Capt. O. M. Carter, Engineer Corps, U. S. A., was elected Member of Council, as well as Mr. Bennet H. Brough, General Secretary Iron and Steel Institute of Great Britain.

Rogers Locomotives for China.

The Rogers Locomotive Co. is about to ship eight locomotives and tenders to China for the Imperial Government Railroads, Lu Han Line. The engraving is from a photograph of one of these and a table of general dimensions follows.



A Rogers Locomotive for China.

MOGUL LOCOMOTIVE FOR THE LU HAN RAILROAD (CHINA).

Description.

Gage	4 ft. 8½ in.
Fuel	Bituminous coal
Weight on drivers	105,000 lbs.
" " truck wheels	20,500 lbs.
" total	125,500 lbs.
Wheel base, total, engine	22 ft. 9 in.
" " driving	13 ft. 9 in.
" " total (engine and tender)	46 ft. 11 in.
Height, center of boiler above rails	8 ft. 8 in.
" of stack " "	14 ft. 10 in.
Heating surface, firebox	126.45 sq. ft.
" " tubes	1,503.35 sq. ft.
" " total	1,629.80 sq. ft.
Grate area	24.2 sq. ft.

Wheels and Journals.

Drivers, number	6 of cast steel
" diameter	60 in.
Truck wheels, kind	Cast steel
" " diameter	36 in.
Journals, driving axle, size	8 in. × 10 in.
" " truck " "	5½ in. × 12 in.
Axles, driving material	Steel
" truck "	Steel

Cylinders.

Cylinders, diameter	19 in.
Piston stroke	24 in.
" rod, diameter	3½ in.
Kind of piston-rod packing	U. S. metallic
Main rod, length center to center	8 ft. 9 in.
Steam ports, length	17 in.
" " width	1⅝ in.
Exhaust ports, length	17 in.
" " width	2¾ in.
Bridge, width	1⅜ in.
Exhaust pipe	single, high

Valves.

Valves, kind of	Richardson
" greatest travel	5½ in.
" outside lap	1 in.
" lead in full gear	1/4 in.

Boiler.

Boiler, type of	Belpaire
" working steam pressure	180 lbs.
" material in barrel	Steel
Boiler, thickness of material in barrel	7/16 in.
" diameter of barrel outside at first course	60 in.
Seams, kind of horizontal	Sextuple riveted
" " " circumferential	Double riveted
Crown sheet stayed with	Radial stays
Dome, diameter	30 in.

Tubes.

Tubes, number	214
" material	Iron
" outside diameter	2 in
" length over sheets	13 ft. 5 in

Firebox.

Firebox, length	7 ft.
" width	3 ft. 5½ in.
" depth front	69½ in.
" " back	61½ in.
" material sides, back and crown	Copper, steel-tube plate
" thickness of sheets	½ in.
" brick arch	Supported on studs
Grate, kind of	Rocking finger

Tender.

Tank capacity	4,000 gals.
Coal "	7 tons
Frame, type of	Steel plate 6-wheeled
Wheels, kind	Cast steel
" diameter	42 in.
Axle, material	Steel
Journals, size	5¾ × 10 in.

Train Accidents in the United States in October.

COLLISIONS.

REAR.

2d, on Eastern of Minnesota, near Nickerson, Minn., a freight train ran into the rear of a preceding freight, which had been stopped on account of the breaking of a coupling, and 10 cars were derailed, several of them being burned.

2d, 11 p. m., on Pennsylvania road, at Rahway, N. J., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, wrecking 10 cars, which fouled all four main tracks. All trains were blocked until about 4 o'clock the next morning. One tramp was injured.

3d, on New York, Chicago & St. Louis, at Willoughby, O., a freight train ran into the rear of a preceding freight, wrecking 7 cars. The engineman was killed.

6th, 1 a. m., on Buffalo, Rochester & Pittsburgh, near Clarion Junction, Pa., a freight train ran into the rear of a preceding freight, damaging the engine and three cars. A brakeman was killed and one conductor was injured.

6th, on Rio Grande Western, near Castle Gate, Utah, a freight train ran into the rear of a preceding freight, wrecking the caboose and 5 cars of cattle. A passenger in the caboose was killed.

7th, on Pennsylvania Lines, near Maywood, Ind., a freight train broke in two and the rear portion afterward ran into the forward one, wrecking several loaded cars. It appears that the engineman discovered the breakage as soon as it occurred and took measures to keep the forward part of the train clear of the rear part, but before he had gone far an air hose burst, setting the brakes on eight cars and stopping the forward portion of the train. The engine, however, broke away from the cars and was unharmed.

9th, on Chicago Great Western, at Fairbank, Ia., a freight train broke in two and the rear portion afterward ran into the forward one, damaging several cars. A tramp was killed.

10th, on Rio Grande Western, at Springfield, Utah, rear collision of freight train; one brakeman killed.

17th, 2 a. m., on New England road, at Readville Mass., a local freight, switching in the yard, was run into at the rear by a following fast freight, wrecking the caboose and 2 freight cars and damaging 10 passenger cars standing on a side track. One of the freight cars took fire and, with its contents, was partly burned up. It would appear that the through freight was running too fast, as, according to the reports, an automatic signal a short distance back from the station indicated danger.

17th, 5 a. m., on Baltimore & Potomac, at 13½ street, Washington, D. C., a freight train ascending a grade broke in two and the rear portion ran back into the head of a following freight, wrecking the caboose. A brakeman was injured.

23d, 5 a. m., on Toledo & Ohio Central, near Bucyrus, O., a freight train standing at the entrance of the yard was run into at the rear by a following freight, wrecking 4 cars. A conductor jumped off and was injured. It is said that the standing train was properly protected by flag.

23d, on Columbus, Hocking Valley & Toledo, near Upper Sandusky, O., a freight train ran into the rear of a preceding freight, wrecking the caboose, which, with two cars of coal, was burned up. The fireman was injured.

24th, on Norfolk & Western, near Tazewell, Va., a freight train broke in two and the rear portion afterward ran into the forward one, derailing 9 cars which fell off a bridge 40 ft. high. A brakeman was killed and 2 tramps were injured, one of them fatally.

24th, 9 p. m., on Wheeling & Lake Erie, at Clyde, O., a freight train broke in two and the rear portion afterward ran into the forward one, wrecking several cars. A

boy stealing a ride was killed and another tramp and one brakeman were injured.

26th, 3 a. m., on Lake Shore & Michigan Southern, near Brocton, N. Y., a freight train entering a side track was run into at the rear by a following freight, and the caboose was wrecked. The wreck took fire and 4 loaded cars were burned up. The engineman was badly burned and the fireman was injured by jumping off. There was a dense fog at the time.

26th, on Wisconsin Central, at Morse, Wis., a passenger train ran into the rear of a preceding freight, wrecking the caboose. The passenger engineman and a passenger in the caboose were injured.

28th, on Lehigh Valley, near South Plainfield, N. J., a freight train which had been stopped in consequence of the breaking of a drawbar was run into at the rear by a milk train and several coal cars were wrecked. The fireman jumped off and was injured. A westbound train ran into portions of the wreck which fouled the westbound track.

29th, on Missouri Pacific, near Tuxedo Park, Mo., a freight train broke in two on a descending grade and the rear portion afterward ran into the forward one, wrecking 7 cars. A tramp was killed and a brakeman was injured.

And 24 others on 18 roads, involving 33 freight and other trains.

BUTTING.

1st, on Chesapeake & Ohio, near Ashland, Ky., butting collision of freight trains; one fireman killed.

2d, 2 a. m., on Georgia Railroad, near Conyers, Ga., butting collision between passenger train No. 4 and freight train No. 13, damaging the engines and several freight cars. One trainman was injured. It is said that a flagman was sent from the freight to stop the passenger, but that he failed to make his signal understood.

5th, on Wabash road, near Naples, Ill., butting collision of freight trains, damaging both engines and several cars. One engineman was killed and several other trainmen were injured.

14th, on Western Maryland, at Chewsville, Md., butting collision of freight trains, damaging both engine and 8 cars. One fireman was fatally injured, and 3 other trainmen were hurt. It is said that an operator neglected to deliver an order to one of the trains.

15th, on Chicago & Eastern Illinois, at Knightsville, Ind., collision of locomotives, badly damaging both. One engineman and one fireman were injured.

16th, on Pittsburgh, Fort Wayne & Chicago, at Allegheny, Pa., butting collision between a passenger train and a switching freight train, damaging both engines and derailing one of them. Two passengers and one fireman were injured.

17th, 1 a. m., on Chicago & Alton, near Mexico, Mo., butting collision of freight trains, badly damaging both engines and ditching 14 cars. One man was killed.

17th, on St. Louis & San Francisco, near Springdale, Ark., butting collision of freight trains, wrecking both engines and 15 cars. One brakeman and 1 tramp were killed, and 2 trainmen and 3 tramps were injured.

20th, on Cincinnati, Hamilton & Dayton, near Dayton, O., butting collision between a southbound passenger train and a northbound freight, wrecking both engines and a mail car. Several other cars were damaged. One passenger and 1 engineman were fatally injured and 2 trainmen and 3 other passengers were less severely hurt. It is said that there was a misunderstanding of orders on the part of the freight train.

21st, on Kansas City, Pittsburgh & Gulf, at Sulphur Springs, Ark., butting collision between a southbound passenger and a northbound freight train, badly damaging both engines and wrecking a mail car and a freight car. The mail clerk was injured. It is said that the collision was due to a misplaced switch.

22d, on Pennsylvania road, at Vandergrift, Pa., butting collision between an eastbound and a westbound freight, wrecking 6 cars. A man riding in one of the cars in charge of a horse was injured by jumping off. It is said that the trains had orders to meet at Vandergrift, and that the westbound train was at fault, the order to take the side track being disregarded.

27th, on the Great Northern, at Hinsdale, Mont., butting collision of freight trains, wrecking both engines and 20 cars. Nearly or quite all these cars were burned up. One engineman and 1 fireman were killed and 3 of the trainmen were injured.

30th, on the Pennsylvania road, near Pond Hill, Pa., butting collision of freight trains, badly damaging both engines and 20 cars. The wreck was piled up in a cut and passengers had to be carried around for several hours. One fireman was injured. It is said that the southbound freight was ordered to wait at Pond Hill for two northbound trains, but that the engineman fell asleep, and on waking assumed that the first train was the second and last to go north.

And 9 others on 9 roads, involving 18 freight and other trains.

CROSSINGS AND MISCELLANEOUS.

5th, on Baltimore & Ohio, in Philadelphia, Pa., collision of freight trains; one engine was overturned and a brakeman was buried beneath it and killed. Another brakeman was injured.

14th, on St. Louis, Keokuk & Northwestern, at Elsberry, Mo., collision between two freight trains at a meeting point, one of which was entering the side track; 6 cars were wrecked and one engine fell down a bank. A tramp was injured.

18th, near Arcata, Cal., collision between a mixed train of the Arcata & Mad River and a log train on the Klamath River Railroad at the crossing of the two roads, badly damaging both engines and several freight cars. One engineman was injured. There was a dense fog at the time.

26th, On Union Pacific at Juiesburg, Neb., collision of engines, injuring 1 fireman.

27th, on Chicago & North Western, near Ives, Wis., a northbound freight train entering a side track was run into by a southbound freight, wrecking the engine and 5 cars. One brakeman and 3 tramps were injured.

28th, 2 a. m., at Binghamton, N. Y., Wells Fargo Express train No. 13 of the Erie road ran into a freight of the Delaware, Lackawanna & Western at the crossing of the two roads, badly damaging several cars. One engineman and 1 fireman were injured. It is said that the Erie train ran past signals which were against it.

And 21 others on 20 roads, involving 10 passenger and 32 freight and other trains.

DERAILMENTS.

DEFECTS OF ROADWAY.

13th, on Chicago Great Western, near Byron, Ill., a passenger train was derailed by spreading of rails and 3 cars were ditched. Two passengers were injured.

26th, on Norfolk & Western, near Welsh, Va., a passenger train was derailed by a broken rail, and the engine and first 2 cars were overturned and fell down a bank. The engineman was killed and the fireman and mail clerk injured.

And 2 others involving 1 passenger train and 1 freight.

DEFECTS OF EQUIPMENT.

1st, on Boston & Maine, at West Medford, Mass., a passenger train was derailed by a brakebeam which fell upon the track and the three rear passenger cars were dragged some distance in the ditch, two of them being partially overturned. Twenty passengers were injured, most of them not very seriously.

3d, 2 a. m., on Denver & Rio Grande, near Cotopaxi, Col., passenger train No. 6 was derailed by a broken axle and three passenger cars were ditched. Two passengers were killed and 2 others were injured, one of them fatally. A dozen others were slightly hurt.

4th, on Pittsburgh, Ft. Wayne & Chicago, near Rochester, Pa., the engine of a freight train was badly damaged and thrown from the track by the breaking of a side rod. The fireman was injured.

8th, on Texas & Pacific, near Dallas, Tex., the locomotive of a passenger train was disabled by the breaking of a driving-wheel axle. The accident occurred near a trestle and the engineman jumped off and was injured.

19th, 2 a. m., on Lehigh Valley road, near Laurel Run, Pa., a car in a freight train was derailed by a broken brakebeam and 11 cars were ditched. A part of the wreck fouled the adjoining main track and a freight train running in the opposite direction was derailed. This added to the wreck, so that the road was blocked about 12 hours, the wreck being in a cut. Two brakemen were injured.

And 14 others on 14 roads, involving 15 freight and other trains.

NEGLIGENCE IN OPERATING.

2d, on St. Louis & San Francisco, at Porter, Ark., a freight train became uncontrollable on a descending grade and the engine and a number of cars ran off the track and were wrecked. The fireman was killed and 2 brakemen were injured. It is said that the air-brake reservoirs were allowed to become empty, so that the engineman could not control the speed of the train.

7th, on Boston & Albany, at Webster Mills, Mass., a freight train was derailed at a misplaced switch and several cars were damaged. A brakeman was injured.

23d, on St. Louis & San Francisco, near Ritchey, Mo., a freight train was derailed on a bridge where repairmen had removed a rail, and the tender and two cars fell down a bank. It is said that a flag had been set out, but that it was not seen. The fireman was slightly injured.

24th, 11 p. m., on West Shore road, at Little Falls, N. Y., the engine of a freight train was derailed at a misplaced switch and fell into the Erie Canal. The engineman was badly scalded.

27th, on Cincinnati, New Orleans & Texas Pacific, at Ludlow, Ky., the two rear cars of a passenger train were derailed by the premature movement of a switch, and one of the cars was overturned. One passenger was injured.

28th, 11 p. m., on Lake Erie & Western, at Fort Wayne, Ind., a northbound passenger train was derailed at a derailing switch, and the engine and baggage car were overturned. The engineman was fatally scalded.

31st, 5:30 p. m., on Pittsburgh, Fort Wayne & Chicago, at Delphos, O., westbound passenger train No. 7 ran into an open drawbridge, and the front part of the engine lodged upon a boat which was passing through at the time. The boat was submerged and the occupants barely escaped with their lives. The engineman was burned by being thrown against the firebox.

And 6 others on 6 roads, involving 7 freight and other trains.

UNFORESEEN OBSTRUCUIONS.

11th, on Pennsylvania road, near Hanover, Pa., a freight train was derailed by running over cattle and 9 cars were wrecked. One brakeman was killed and 2 injured.

13th, on Philadelphia & Reading, at Reading, Pa., several cars of a freight train were derailed by running over the body of a man who tried to get aboard one of the cars for a free ride to Philadelphia.

And 5 others on 4 roads, involving 1 passenger train and 4 freight trains.

UNEXPLAINED.

4th, on Louisville & Nashville, near Montgomery, Ala., a passenger train was derailed; the fireman was killed and the engineman and 1 postal clerk were injured.

4th, on Pittsburgh, Cincinnati, Chicago & St. Louis, near Piqua, O., passenger train No. 21 was derailed at a frog and the engine and baggage car were ditched. Two passenger cars were badly damaged; engineman, fireman and baggageman injured.

6th, on Atchison, Topeka & Santa Fe, at Hutchinson, Kan., a car in a circus train was derailed and overturned. A circus man sleeping in a wagon on the car was killed and 2 others were injured. The car, 70 ft. long, appears to have been derailed at a frog, but the frog was found afterward in good condition.

11th, on Chicago, St. Paul, Minneapolis & Omaha, at Windom, Minn., a freight train was derailed; the fireman was killed and a brakeman was injured.

13th, on Pennsylvania road, at Glen Campbell Junction, Pa., a switching engine was derailed and the conductor and 1 brakeman were killed.

15th, on Mobile & Birmingham, near Safford, Ala., a passenger train, drawn by an engine running with the tender foremost, was derailed and the engine and first 3 cars fell down a bank. The engineman and fireman were killed and the conductor, 1 brakeman and 1 passenger were injured. The train was running at high speed, but the tender was the first vehicle to jump the track.

18th, on Norfolk & Western, near Ford's, Va., 9 cars of a freight train were derailed and wrecked; 1 brakeman injured.

21st, on Pittsburgh, Bessemer & Lake Erie, at Sharon, Pa., a freight train was derailed and the engine and 10 cars were damaged. A brakeman was badly injured.

24th, 5:50 a. m., on New York Central & Hudson River, near Garrison, N. Y., southbound passenger train No. 46, running about 45 miles an hour, was derailed, and the engine and 7 cars fell into the Hudson River. The water at the point of derailment is very deep and the engine and tender sank in a depth of about 40 ft. The express car, baggage car and day passenger car were detached from their trucks and floated. The next 3 cars, sleepers, were partially submerged. Eighteen passengers in the day car were drowned, together with the engineman, the fireman and a clerk in the employ of the road, who was riding on the engine; 7 passengers and 1 trainman were injured. The cause of the derailment is not yet settled. An investigation has been made by the State Railroad Commissioners, but no report of their findings has yet been issued.

And 16 others on 14 roads, involving 1 passenger train and 15 freight and other trains.

OTHER ACCIDENTS.

7th, on Cleveland, Cincinnati, Chicago & St. Louis, at Miamisburg, O., the engine of a passenger train was damaged by the breaking of a side rod and the engineman and fireman were injured.

21st, 2 a. m., on Chicago, Indianapolis & Louisville, near New Albany, Ind., a car of oil in a freight train was discovered to be on fire, and the trainmen with difficulty separated the caboose from the rear and the engine and 13 cars from the forward end of the train and started for New Albany to secure assistance. While they were gone three oil cars exploded and 8 cars were wrecked and burned up. A dwelling house was badly damaged by the concussion and an occupant of it was injured.

25th, on Delaware Railroad, at Seaford, Del., the cab of the engine of a passenger train was badly damaged by a telegraph pole which had been blown over, and the engineman and fireman were injured.

And 3 others involving 3 passenger trains.

A summary will be found in another column.

Street Railroads and Municipal Corporations.

Continuing the hearing reported last week, page 832, the special committee appointed to consider the relation between street railway and municipal corporations met at the State House on Monday of this week. The first witness, Albert B. Drake, formerly Superintendent of Public Works of New Bedford, appeared for the Massachusetts Street Railway Association, to offer testimony in rebuttal of the argument of Superintendent of Streets Dickenson, of Springfield, to the effect that it costs five cents per foot more to maintain streets through which an electric railroad passes, than it does where there is no railroad. He stated that he had kept a separate account in New Bedford from 1884 to 1896 and found that in all streets without tracks the cost of maintenance was 7.3 cents per lineal foot, while in streets with tracks it was 7.27 cents per foot each year, or practically the same. He cites Union and Court streets in his city as parallel streets with the same general amount of traffic, but one having electric car tracks and the other none. In 10 years it cost 6.94 cents to maintain the street with tracks and 11.7 cents per foot to maintain that with none.

An appellate tribunal on granting street railroad locations was advocated by S. Endicott Peabody, of Salem; Wm. B French, of Winchester, and E. F. Atkins, of Belmont.

Herbert L. Harding, Secretary of the Citizens' Association, then stated that the organization he represented believed the relations between street railroads and municipal corporations were all wrong, creating mutual antagonisms which should be removed. Owing to uncertainty of tenure, street roads are now compelled to float their bonds at a high rate of interest, and to conduct their business expensively. Then they have been forced to fight for their lives, and so have gone into politics, which is debasing to public morals. He argued that a street railroad paid no more tax than a banking or manufacturing corporation, being assessed on precisely the same basis, which was evidence that it paid no franchise tax whatever. The solution of the problem lies in some form of profit sharing with the public. A great burden is thrown upon the municipality for repair and widening of streets where street railroads are located, so in this way it contributes capital to the enterprise, and should be a profit sharer. Chairman Adams said the witness was simply clouding the issue, profit sharing was a tax. Mr. Harding responded that profit-sharing was considered equitable and was becoming popular, to which Mr. Adams replied that it did not help a tax to call it some other name.

Mr. Harding presented a bill which he offered the Legislature this year for a 30-year tenure and a franchise tax of three per cent of gross earnings, and a sum equal to any amount a street railroad shall pay in dividends above five per cent. He said the bill exempted all companies which in the judgment of the railroad commission paid less than five per cent. In answer to Chairman Adams he admitted that his bill did not cover the frequent case where a road was able to pay no dividends for years and then paid five per cent. or over. He thought that Commissioner Hayes was right in saying that the municipality should share the burdens of disastrous years as well as the profits.

The West End (Boston) Lease Not Approved.

On Tuesday of last week the Massachusetts Railroad Commissioners made a special report disapproving the lease of the West End Street Railway Company by the recently incorporated Boston Elevated Railroad Company. Without this approval the lease cannot become valid. Two principal reasons are given for refusal. The first of these is that the lease takes the West End out of the special class of railroads that may be controlled at any time by special legislation and places it under the charter which especially provides that "no other burden, duty, or obligation which is not at the same time imposed by general laws on all street railway companies" shall be placed upon it. This, in the opinion of the Commissioners, removes an important safeguard to public security and convenience in the conduct of the road, by making it necessary to apply to every road in the state any measure needed to correct local abuses of any kind. The other main objection to the lease is that, because of its long term (99 years), it would exercise an important influence towards blocking any reforms in the reduction of existing fares, because of the large compensation to be paid to the West End, which would, in the opinion of the Commissioners, severely tax the earning power of the new company.

This latter objection is the more important in the minds of the Commissioners, who lay particular stress on the fact that the policy of the Legislature in dealing with important questions of rapid transit has always been to grant a lease for only a limited period—say, from 20 to 25 years, as in the case of the lease of the Boston subway to the West End for 21 years. On this point the report says:

"Running thus counter to the sharply defined line of public policy, it is not easy to see on what ground the lease can be justified as a private contract. Its motive and essential conditions—the subway and the enjoyed immunities—lapse in 20 and 25 years. Who can venture to predict what changed conditions will then exist or arise? Except upon the assumption that the parties who shall then hold this lease, fortified by the possession and control of the West End system, can prescribe the terms of the contracts and adjustments to be made for the 75 or 80 years beyond, the lease is an improvident contract."

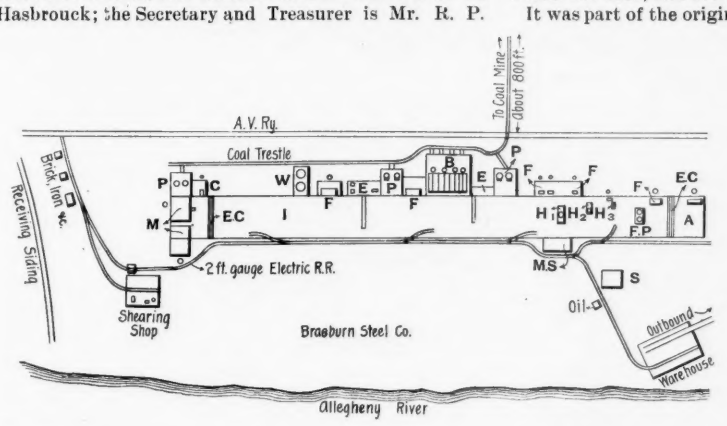
In the course of the decision, the report of the appraisers is referred to, in which it was shown that the full value of the West End property is $25,606,808, while the capitalization and net debt of the company is $26,341,193, showing a deficiency of assets of over $734,000, which detracts from the value of the stock; and this deficiency properly attaches to the common stock as the inferior security, with the result that each $100 of common stock represents about $92 of actual property, thus making the rental, including taxes, amount to over 11 instead of 8 per cent. This percentage or annual dividend must be paid for the term of 99 years to stockholders of the West End on the par value of their shares. This, the Commissioners point out, is excessive. Regarding the use of the subway, the report states as follows:

"The Board declined to approve the subway contract until a clause had been inserted by which the West End, or any other company using the subway, was made expressly subject with respect to the railway and tracks located in the subway, and the equipment, use and operation thereof, and transportation thereon, not only to the general street railway laws, but to any other laws or acts which are or may be applicable to the party of the second part (the West End) or such other company, not inconsistent with the specific grants of the contract."

A press dispatch of Nov. 30, states that the Elevated Railroad Company has made a new proposition to the West End, offering to take a lease for 25 years, guaranteeing dividends on the common stock of 7 per cent,

The Braeburn Steel Works.

A few gentlemen organized, some months ago, the Braeburn Steel Company, and built the works which have recently been opened. The directors of this company are Mr. William Metcalf, Past President Am. Soc. C. E., who needs no introduction to the readers of the *Railroad Gazette;* Mr. Charles Metcalf and Mr. P. B. Hasbrouck; the Secretary and Treasurer is Mr. R. P. Kelly. The works are designed to make tool steel and open hearth steel, die blocks, and bars and forgings in general. The names of the gentlemen at the head of this concern are sufficient warrant of its character and probable success.



M—*Melting furnaces.*
P—*Gas producers.*
C—*Crucible shed.*
I—*Ingot floor.*
W—*Water tanks.*
F—*Heating furnaces.*
14-in.—*Bar mill.*
10-in.—*Bar mill.*
B—*Boilers.*
H_1—*3-ton hammer.*
H_2—*1,500-lb "*
H_3—*500-lb. "*
F P—*Forging press.*
A—*Annealing dept.*
Main building, 725 ft. long; 50 ft. clear span.
E C—*Electric cranes.*
E—*Engines.*
M S—*Machine shop.*
S—*Storeroom.*

Braeburn Steel Works.

The plant of the Braeburn Steel Company is at Braeburn, on the Allegheny Valley Railway and Allegheny River, 23 miles from Pittsburgh. The property, about 16 acres, is a piece of high, bottom land, lying between the railroad and the river, and about 1,600 ft. long on the line of the railroad.

Near the upper end of the property a railroad siding extends across the property. Alongside of this track are the brick, clay and iron sheds, and metal yard, and on the opposite side of these sheds there is a 2-ft. gage railroad which leads to the shearing and mixing shed, then to and along the main building, and the storehouse and oilhouse, and into the warehouse. Four sidings are run from this track into the main building for the delivery of raw material and the reception of finished product.

A standard gage siding leads from the warehouse, out of the lower end of the property to the main tracks of the Allegheny Valley Railway. This is used for shipping finished steel.

The main building is 725 ft. long and 50 ft. span between crane rails. The crane rails run the whole length of the building, and there are two electric cranes, one of 10 tons and one of 5 tons capacity.

The 2-ft. gage railroad is furnished with electric trolley locomotive and a train of substantial iron cars. The generator for this locomotive is in the shearing shop, and is independent of the crane system.

In the upper end of the main building are the melting furnaces, one crucible furnace and one 5-ton basic open hearth. The charges for these furnaces are brought from the shearing shop on iron cars, pushed into the main building, picked up by the electric crane and delivered on the furnace platforms. The next 100 ft. of the main building is the ingot inspecting and storing room. Either of the cranes can take ingots from here and deliver them to any of the furnaces in a few moments.

Next to the ingot-room is the 14-in. bar mill; the train extends across the building, and its engine is in a lean-to shed adjoining. Next to the 14-in. mill is a 10-in. bar mill similarly placed, and about 200 ft. from the 14-in. mill, giving plenty of floor room for each mill. About 120 ft. from the 10-in. mill is the 3-ton hammer, next there is a 1,500-lb. hammer and next a 500-lb. hammer. Beyond this the forging press is situated. This last machinery is not delivered and cannot be described at present. At the farther end of the building is the annealing department. All of the furnaces, gas producers, boilers, and mill engines are under lean-to sheds on the side next to the Allegheny Valley Railway. The furnaces are so placed that ingots can be delivered directly to the furnace doors, and heavy ingots can be put into and drawn from the furnaces by the electric cranes.

Each mill floor, the hammer shop and the annealing department has its own siding running in from the 2-ft. gage track so that the electric locomotive and train can gather up finished steel wherever it may be and deliver it in the warehouse.

About 800 ft. south of the Allegheny Valley Railway tracks and about 23 ft. above the tracks is the opening of the company's coal mine. The mine is in the upper Freeport seam, and it has developed a clear 4-ft. working breast. A trestle from the mine crosses the railroad with 23 ft. clear headway and extends along the building to the boilers and all of the gas producers; chutes lead down to boilers and producers, so that the miner's car is dumped at the firemen's feet.

All of the furnaces except one or two little ones, where natural gas was more convenient to use, are of the Siemens regenerative type. These furnaces, a little more expensive in first cost, are so incomparably superior to any other known furnace in every other way, that it was deemed economical to build them even with hearths as small as 6 ft. × 4 ft. The Smythe water seal gas producers are used, and are working well.

It was part of the original plan to run the 2-ft. track along under the coal trestle to carry away ashes, etc., but it was found that the ground was a few feet lower than the railroad, and, with some experience of Allegheny floods and mud, it was decided to keep up to the level of the railroad with the mill floor. This was done, and the filling cost about as much as was saved in trolley track. The hollow left between the buildings and the railroad bank will furnish a handy ash dump for some years to come.

The roll trains were built by the Frank-Kneeland Machine Co., of Pittsburgh; the engines by Wm. Tod & Co., of Youngstown, O.; the boilers, old style two-flue boilers, by R. Munroe & Son, Pittsburgh; the hammers by Bement, Miles & Co., of Philadelphia; the cranes by the Shaw Electric Co., or Manning, Maxwell & Moore, of New York; the generaters by the Card Electric Co., of Mansfield, O.; the trolley locomotive and cars by the Jeffrey Mfg. Co., Columbus, O. The buildings were designed and erected by the Shiffler Bridge Co., of Pittsburgh; high, well lighted, substantial and roomy, they are a pleasure to the workers in them, and a credit to the builders. Nothing was bought for cheapness; everything in the plant is of the best of its kind as far as the owners know.

From the description and plan it will be seen that the prevailing idea in the arrangement was continuous motion, without traveling back or crossing and recrossing; the least possible amount of heavy hand labor, and such conveniences as will enable men to do the most work with the least effort and greatest comfort. Now that the plant is built and paid for, simple, economical, and as good as money could buy, what are the owners going to do with it? They are going to try and make good steel, the best they know how to make now or that they can learn about hereafter, and that ought to be pretty good. They hope to make it cheap enough to command a share of patronage, and good enough to hold its place. The best of the Braeburn brands will be that which will do the required work at least cost to the purchaser. It will often require a little time to find out what this brand is in a given case, but when it is found it is to be stuck to.

The Braeburn Steel Company has no fads and no mysteries, and no patents for sale. How could the author of "Steel; a Manual for Steel Users" permit any of them where he has control? The company intends to ask the consumer to try, and after trial to make his own decision, which he would do anyway.

An Interurban Railroad in Iowa.

The Mason City & Clear Lake Traction Company was incorporated some time ago under the Iowa laws with a capital stock of $200,000 and began operations July 3 last. The road is of special interest as being among the first electric interurban lines in the West to handle regularly both passenger and freight traffic. It works 7.46 miles of track within the limits of the town of Mason City, 0.54 miles within the town of Traction Park and 2.5 miles within the limits of Clear Lake, while outside the town limits there are 7.10 miles of main line along which the company has a perpetual right of way 33 ft. wide. The lines within the several towns are operated under 25-year franchises. The road connects the towns of Mason City, Traction Park and Clear Lake in northern Iowa, and first class construction has been used throughout. The cost of building and equipping the road, which is of standard gage, was $201,000.

The rails weigh 60 lbs. per yard and are laid on cedar ties spaced 2 ft. center to center with suspension joints and Servis tie-plates. The rails were rolled by the Illinois Steel Co., and the special track work, frogs, switches, etc., was furnished by the Paige Iron Works, of Chicago. The overhead trolley is used with large trolley wires and feeders, cedar trolley poles being used, excepting within the town limits, where the poles are of iron.

The power-house and car barn are about half-way between Mason City and Clear Lake, at Traction Park, where the company owns 10 acres of land. The power-house is a building 200 ft. long by 50 ft. wide, and the car barn is 165 ft. long by 40 ft. wide. Both buildings are of fireproof construction throughout. In the power-house is a battery of four boilers, one 150 H. P. and one 300 H. P. Allis engine, beside one 200 H. P. generator, one 300 H. P. generator and a switchboard, which were supplied by the Walker Co.

The rolling stock consists of 16 cars built by Pullman which are equipped with Peckham suspension trucks and Walker motors. The following is a list of rolling stock:

One electric locomotive, 150 H. P. capacity.
One double-truck motor car, 200 H. P. capacity.
Four single truck motor car (each), 50 H. P. capacity.
Six open trailers, 42 ft. long.
One closed trailer, 42 ft. long.
One combination baggage and express car.
Two flat cars.

The motor cars are equipped with air-brakes, and the closed cars with electric heaters.

The road is run as a feeder of the Iowa Central, which it joins at Mason City. During the past three months, in addition to local traffic, it has handled considerable freight, principally live stock. The company has stock yards at Clear Lake and Traction Park and also connects with the Iowa Central stock yards at Mason City. The principal officers are Mr. W. E. Brice, President and Treasurer; Mr. L. H Ong, Secretary and General Manager; Mr. F. J. Hanlon, Auditor.

American Society of Mechanical Engineers.

The opening session of the annual meeting of the American Society of Mechanical Engineer, held at the Society's house on Tuesday evening of this week, was largely attended. At 9 o'clock the meeting was called to order by the Secretary, and after a few incidental matters had been disposed of Mr. Worcester R. Warner, President of the Society, delivered his annual address, the subject being, "The Evolution of the Telescope." In his preliminary remarks, he stated that it had been the invariable custom of the Presidents of the society to discuss some subjects in their annual address with which they had had considerable experience, and so he had chosen the subject mentioned. The study of the telescope was treated first historically, careful consideration being given to a description of the different forms of mountings both in this country and abroad. In an interesting manner he traced the development of the study of the geography of the heavens from the earliest records to the completion of the Yerkes telescope at Chicago. This subject is not one to interest the astronomer alone, but Mr. Warner pointed out that the telescope is indispensable to the engineer. Furthermore, the telescope with an attached camera now does in 40 minutes what it formerly took an able astronomer four years to accomplish, and does it better, mapping the stars he has never seen and making a permanent record with no discount for the personal equation.

Following the reading of the paper, Mr. Warner showed many interesting photographic slides which were placed on the screen. Many of the views possessed considerable historical interest and altogether formed quite a complete history of the development of the telescope following along the lines somewhat similar to that followed in treating the subject in his paper.

The annual report of the Council urges the voting membership to write fully concerning the candidates in whose election they are interested. Two instances were reported of Japanese engineers who had studied in this

country, but had returned to Japan, who desired to become members of the Society, but did not know a sufficient number of the members to second their application. A paragraph was added to the rules of the Society whereby applicants not residents in North America and not personally known to five members of the Society may be recommended by ballot by five members of the Council. The total membership of the Society at the present time is 1,823, of which 16 are honorary members, 1,365 members, 119 associates and 323 junior members. The Council announced that the Transactions of the Society would hereafter be sent to any institution desiring them at the half-rate allowed to members; namely, in paper binding $5 and half morocco $6. The Council further announced that Mr. George Westinghouse was unanimously elected an honorary member of the Society. The Treasurer's report showed that the total receipts for the first year amounted to $28,385 and the disbursements to $28,338.

The business session of the annual meeting was held Wednesday morning, at which time reports were received from different committees appointed at the last meeting, from the professional committees on the revision of the 1885 code for conduit boiler trials, from the delegates from the Society to the Conference on Standard Electrical Rules and a delegate to the International Conference of Stockholm on Testing of Materials, a report of which will be found elsewhere in this issue. The following officers have been elected for the ensuing year:

President, Charles Wallace Hunt, New York. Vice-Presidents: E. S. Cramp, Philadelphia, Pa; S. T. Wellman, Cleveland, O.; W. F. Durfee, New York City; John C. Kafer, New York City; David R. Fraser, Chicago, Ill.; Walter S. Russel, Detroit, Mich. Managers: Norman C. Stiles, Watertown, N. Y.; E. D. Meier, St. Louis, Mo.; Geo. W. Dickie, San Francisco, Cal.; H. S. Haines, Atlanta, Ga; Gus C. Henning, New York City; A. Wells Robinson, Milwaukee, Wis.; Jas. B. Stanwood, Cincinnati, O.; Henry H. Suplee, Philadelphia, Pa.; Geo. Richmond, New York City. Treasurer, Wm. H. Wiley, New York City.

Following are abstracts of papers presented at the different sessions held Wednesday, Thursday and Friday:

A WATER PURIFYING PLANT.—BY MR. HOWARD STILLMAN.

In this paper is described the plant established at Port Los Angeles Cal., for purifying the water supplied to locomotives on the Southern Pacific Railroad. It is designed to do away with an elaborate system of works and to furnish a continuous supply of treated water without more than the usual attendance at water stations. The process has been "standardized," so as to be applicable to any point on the road. The water is treated cold.

The water is pumped from a well into a main at the rate of 11,000 gals. per hour. The main is intercepted by two tanks, 4½ ft. diameter ×8 ft. high, divided by partial diaphragms which retard the water and allow time for chemical action to take place. The water enters each tank in turn at the bottom and leaves at the top. Five minutes is the time required for the water to pass through these tanks. Just before entering each of the circulating tanks the main is tapped by ½-in. pipes through which a solution passes from each of the two chemical tanks. The chemical tanks hold a sufficient supply for treating 44,000 gals. of water and the flow of the solution is regulated by the pressure of compressed air introduced at the top of the tanks. The first chemical tank contains a solution of slaked lime which is continually stirred by paddles driven by an air motor on top of the tank. The second chemical tank contains a solution of soda ash which does not require stirring. It requires about five minutes' time to refill the chemical tanks and recharge with air during which time the water supply or pump is stopped.

After leaving the circulating tanks the water passes in turn through two storage and settling tanks, each of 50,000 gals. capacity, being introduced near the bottom of each and drawn off near the top. The pump maintains the circulation and the storage tanks are situated on a bluff at a considerable height above the tracks.

With the treated water no scale forms in the boilers and there is a small deposit of magnesia sludge; previous to the treatment the water formed a large amount of hard scale with considerable corrosion. The following gives the results of analyses of water at Port Los Angeles before and after treatment:

Well in Bed of Canon About 100 Yards from Ocean Beach.

Date of Analysis.	Before March, 1896.	After. December, 1896. Lime, $1\frac{64}{100}$ lbs. Soda Ash, $\frac{2}{10}$ lbs.
Treatment per 1,000 Gals. Contained in the water in solution in grains in per U. S. gallons:		
Carbonate lime	14.29	.69
Sulphate lime	5.07	.29
Carbonate magnesia	1.22	7.15
Sulphate magnesia	17.15	1.63
Silica	1.34	.11
Alumina	.17	.17
Sulphate soda	3.56	27.92
Chloride soda	8.75	5.71
Total	51.55	43.67
Incrustating matter	39.24	10.04
Non-incrustating matter	12.31	33.63

Cost per 1,000 galls. to treat, 4 cents.

REVISION OF THE CODE OF 1885 FOR STEAM BOILER TRIALS.

The report is submitted by a sub-committee and is subject to revision after the meeting. The principles which governed the committee of 1885 in the preparation of the code of rules are in accord with the views of the present committee. During the interval of 12 years methods and instruments have changed. Throttling and separating calorimeters have displaced the barrel and other types of steam calorimeters referred to in the previous report. Considerable attention is now given to the determination of the calorific value of coal, and coal calorimeters are now successfully used. It is the usual practice now to include in the table of results of boiler tests the percentage of "efficiency" or proportion of the calorific value of the coal, which is utilized by the boiler. Also the analysis of flue gases is receiving more attention. The revised code, termed the Code of 1897, is substantially the same as that of 1885, with such amendments as recent experience has shown to be desirable.

Beside the amendments to the Code of 1885 concerning the determination of "efficiency" and the use of improved steam calorimeters, directions are given for sampling the coal for determining the heat of combustion from the chemical analysis of coal and for working out a heat balance. The committee approves the former standard "unit of evaporation," namely, one pound of water at 212 deg. Fahr. evaporated into steam of the same temperature; also that 34½ units of evaporation shall be taken as one commercial horse-power.

There are 38 appendices to the new code of which 19 have either been adopted in whole from the former code or revised; the remaining ones were presented by members of the present committee and still others may be added. These discuss quite fully the various questions which have arisen in connection with boiler testing.

CAST IRON UNDER IMPACT.—BY MR. W. J. KEEP.

The object of the experiments described in the paper was to determine the influence of shock upon cast iron. They incidentally show the use of mechanical analyses in determining the cause of physical changes which take place in cast iron. The kind of shock considered is a blow, not sufficient to produce distortion of the test bar. Test bars were also subjected to shock by milling them in a tumbling barrel. The following observations were made:

Striking a test bar on the side or end decreases its length. Test bars milled in contact with other castings in a tumbling barrel increase in length. Milled test bars show large increase of strength. Blows delivered on the side or end of a test bar do not increase the strength. Test bars ½ in. square increase in strength until they have been milled two or three hours, but not materially by longer milling. Of milled bars the weakest bars are most strengthened and the strongest bars are strengthened very little. The strength gained by milling is due to making the surface of the test bar smooth and to condensing the surface by peening. The removal of the surface weakens a test bar while smoothing the surface without removing it strengthens it. Smoothing the surface by pounding with a hammer increases the strength by condensing the grain. Test bars of gray iron containing least silicon gain most by the process of milling.

A SCREW DIE FOR THE TURRET LATHE.—BY MR. JAMES HARTNESS.

The die described and illustrated (Fig. 1) is intended for turret lathe and screw machine use, but may be used on any machine in which the work is rotated for cutting threads from ⅛ to 1¼ in. in diameter with pitches not coarser than 7 per inch. Any thread excepting the square form can be cut. The die head is held

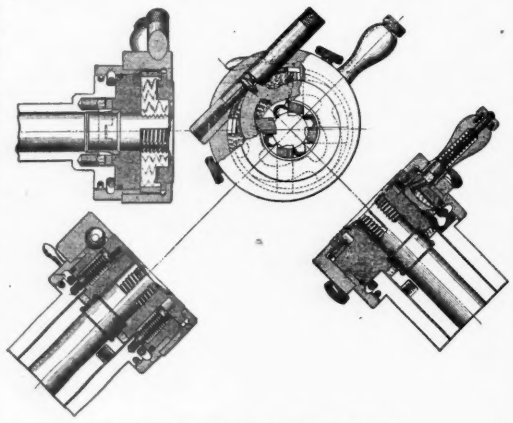


Fig. 1.—Screw Die for Turret Lathes

against the face of its holder by a spring pressure which permits a slight forward movement of the head relative to the holder, and provides a means for automatically opening the die. The chasers are held in working position by an encircling cam bearing directly over the working teeth. The teeth at the front of the chaser have a cutting clearance, while those at the back have no clearance but ride on the thread and control the lead. The lead controlling feature is very accurate and the die is very compact.

A BOILER SETTING.—BY MR. G. W. BISSELL.

The engraving (Fig. 2) shows a method for supporting a horizontal return tubular boiler 54 in. in diameter by 16 ft. long. Two pairs of lugs of special design are attached to the sides of the shell above the fire. These lugs rest on hangers of 1 in. round iron, which are carried by nuts on wrought-iron saddles cut from flat bar iron and the saddles rest on I-beams. At the front end of the boiler one 7-in. beam is used. At the back end the saddles are supported by an 8-in. equalizing I-beam 5 ft. long, which rests on a 1-in. roller which in turn has a bearing on a 9-in. I-beam. The latter, and also the 7-in. I-beam at the front end, rest on pairs of columns for which 6-in. channel beams are used. Suitable castings serve as sole-plates for the I-beams and as caps for the columns.

The advantages possessed by this design over others in more general uses are: First, Three-point support for the boiler, by which it is freed from strains due to settling of the columns or setting. Second, Independ-

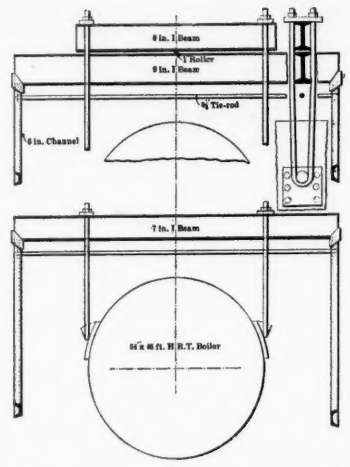


Fig. 2.—Method of Supporting a Horizontal Boiler.

ence of the boiler and the setting, prolonging thereby the life of the setting and making easy the laying up of the new and the repairing of the old brickwork.

DUSTLESS BUILDINGS.—MR. C. J. H. WOODBURY.

This paper described a method of preventing the entrance of dust into modern office buildings. The heating and ventilating is by a blast of air drawn down a flue. This is heated and forced through the building. Dust is removed from the air by cotton cloth filters so arranged that the current shall approach the fabric at an acute angle and the momentum of the particles will cause them to glance off and be collected at the bottom of the filter. To accomplish this a number of long cloth bags over 30 ft. long are hung down the intake flue. The bags are square at the top and are supported in the shaft from a frame divided by partitions. The lower part of each bag is cylindrical and of less cross-section than the top, and the bottom of each is closed by a drawing string. An arrangement of guides, ropes and pulleys enable the bags to be raised and lowered when they are cleaned. In a flue where the velocity of the air was 700 ft. per minute, it was reduced to 26 ft. per minute through the fabric, and from one-half to one peck of dust was removed from the air a month. The efficiency of this device, which has been patented, was tested by putting freshly painted boards at the bottom of the flue, and it was found that these dried with a smooth surface.

MACHINE MOLDING.—BY E. H. MUMFORD.

The idea of applying a power-driven vibrator directly to the plate carrying the patterns to thus vibrate them independently of other parts of the machine, the flask and the sand, has been the subject of the issue of patents to Mr. Harris Tabor. In the operation of this machine, the ramming head of the machine, which can be thrown back, is drawn into a vertical position after the flask has been placed and filled with sand. A three-way cock is then quickly opened, admitting compressed air to an inverted cylinder near the bottom of the machine. The cylinder with the upper part of the machine, together with the flask and sand, is thus driven up against the ramming head. Gravity returns the machine to its original position when the three-way cock is opened to the exhaust. After pushing the ramming head back, the operator, by drawing a lever forward and down, raises the outer frame of the top of the machine containing the flask pins away from the patterns, thus drawing the latter from the sand. As the operator moves the pattern-drawing lever with his right hand, he presses with his left a valve which admits compressed air to a pneumatic vibrator. This consists simply of a double-acting elongated piston having a stroke of about $\frac{5}{16}$ in. in a valveless cylinder, and striking upon hardened anvils at either end at an estimated rate of 5,000 blows per minute. These vibrations are communicated to the patterns, and yet kept from being transmitted to the rest of the machine by an arrangement of elastic bushings. The action of the vibrator is such as to give the whole pattern surface a violent shiver, while the actual movement of the pattern is so slight that it is found to fill the mold completely.

ELECTRICITY IN COTTON MILLS.—BY W. B. SMITH.

It is the purpose of this paper to attempt to describe from the actual operation of two plants working under as nearly identical conditions as two manufacturing institutions can—the one operated by rope transmission with heavy head shafts, sheaves, etc., and the other by means of motors distributed throughout the building. In one the actual operation of the steam engine is considered; in the other the current is supplied to the motors from the secondary switchboard or receiving station.

Many have considered electric transmission in the light of a source of power, and we often hear compari-

sons of it with regard to power costs which are very misleading. Some have been imprudent enough to assert its economy for power purposes in connection with uneconomical water-power plants as the means of making such developments commercially available, and several large plants for cotton mills have been developed on this line with blindness as to their true commercial value.

For the purposes of this paper we will take up the investigation, by tabulated data, from the actual every-day operation of the plants, and we shall designate the two plants as No. 1 and No. 2. No. 1 is a steam-driven mill, having a steam plant geared up with ropes, heavy headed gearing, and large tapering shafts as such plants are usually geared up in the best practice of to-day. The steam engine is an 800-H. P. Corliss cross-compound, built in 1895, with cylinders 20 and 40 × 60-in. stroke, and a rope wheel 24 ft. pitch diameter, grooved for 26 1¾-in. ropes, weighing 35 tons. This engine is being operated at an exceptionally low cost per horse-power for steam. There was in the mill during the period for which comparison of power is made 11,776 spindles and 720 looms; all the spindles and preparatory machinery were run full, but the looms did not average more than 682 per day. No 2 is an electric driven mill which rents its current from a central station and distributes it through a continuous reading wattmeter to four 150-H. P. inverted motors bolted to the ceiling in convenient locations for economical distribution of the power, and belted to the shafting. The mill has been in operation since Jan. 1, 1897. This mill had in operation during the period named above on an average of 12,448 spindles, with preparatory machinery and an average of 356 looms out of 500 in the mill. The weight of the shafting in the steam mill is approximately 136,000 lbs. and the electric mill 122,000 lbs.

From the data obtained from the steam-driven mill we have the following distribution of power during the test—for the steam-driven mill:

Total power.	Looms and shafting.	Friction.	H. P. spds.	Looms.
535	340	226	196	114

and for the electric driven mill:

Total power.	Looms and shafting.	Friction.	H. P. spds.	Looms.
418	206	149	208	60

Hence, the difference between 226 and 149 H. P., 77 H. P. must be credited to the electric mill in its present condition.*

The following points from the foregoing can be stated as existing under the present conditions: the steam mill is operating under a disadvantage of an underloaded engine; the electric mill is operating under the disadvantage of driving more shafting per motor than it will when the full complement of machinery is installed.

The steam mill requires more supplies in the shape of oil, sizing for ropes, and other necessary incidentals due to the method of transmitting the power. The electric mill has cost nothing for its motors in six months of operation, not even the necessity of putting oil in the bearings, which was simply renewed once in that time as a precaution. The convenience of operating any section of the mill *ad libitum*, without reference to the other sections, is an advantage which is felt in dollars and cents in plants using the electric transmission.

The question which arises as to whether a generator directly connected to an economical type of engine to produce the power would consume the difference in the frictional horse-power, is one which can only be answered from data from institutions having such plants.† It is the author's opinion that this difference of power would not be exceeded, and he hopes subsequently to give more specific data from further experiment from the actual operation of these two plants under better conditions, viz., when both mills are completely filled with machinery and motors and engine run at their full load; also in obtaining the efficiency of direct connected engines and generators. It must be borne in mind that, unlike a machine shop and other manufacturing establishments, where a large amount of shafting is required to cover the ground and where intermittent power is used, a cotton mill drives in useful effect 95 per cent. of its shafting and uses actually in continuous operation almost the maximum power at all times.

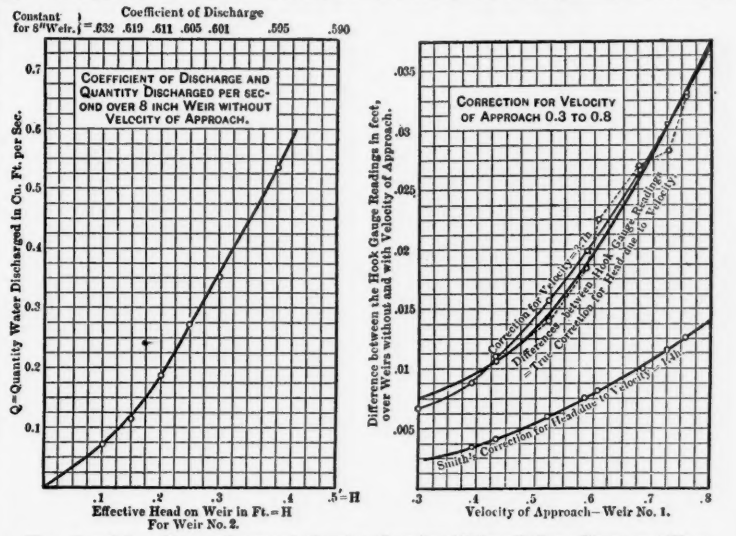
* In this case, it will be noted that about 42 per cent. was lost in friction with the steam-driven mill and 35 per cent. in the electric driven mill.

† See *Railroad Gazette* of Nov. 19, 1897, p. 820, for some information covering this point.

TEST OF CENTRIFUGAL PUMP, ETC.—BY PROF. R. C. CARPENTER.

The paper first contained a description of the plant in which diagrams were used in explaining the details. The method of testing and of computing the coefficients of discharge were then considered at some length. The results which would probably prove of most interest to our readers is given in the accompanying diagrams, Figs. 5, 6 and 7, which show the efficiency of the pumping machinery. The tests which were made show the indicated horse power for each engine corresponding to different heads and different volumes of water discharged. The work of raising the water against the head for the stated

(*Continued on page* 854.)


Constant for 8" Weir.
Coefficient of Discharge
.632 .619 .611 .605 .601 .595 .590
COEFFICIENT OF DISCHARGE AND QUANTITY DISCHARGED PER SECOND OVER 8 INCH WEIR WITHOUT VELOCITY OF APPROACH.
Q = Quantity Water Discharged in Cu. Ft. per Sec.
Effective Head on Weir in Ft. = H
For Weir No. 2.
.5' = H
CORRECTION FOR VELOCITY OF APPROACH 0.3 TO 0.8
Difference between the Hook Gage Readings in feet, over Weirs without and with Velocity of Approach.
Smith's Correction for Head due to Velocity = Vdh
Velocity of Approach—Weir No. 1.

Figs. 6 and 7.—Observations and Results Showing Sibley College Tests on Effect of Velocity of Approach.

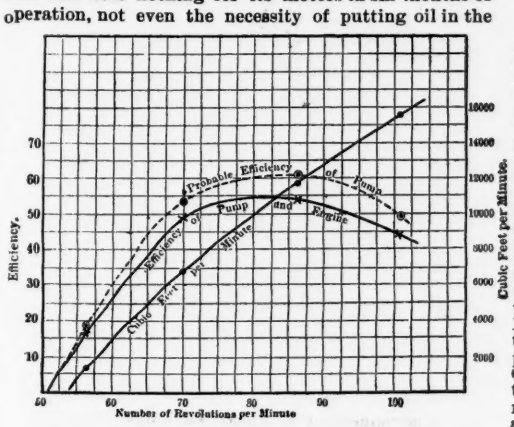

Probable Efficiency of Pump and Engine
Efficiency of Pump and Engine
Cubic Feet of Water per Minute
Efficiency.
Cubic Feet per Minute.
Number of Revolutions per Minute

Fig. 5.—Results of Tests on a Centrifugal Pump.

A Government Armor Works.

Congress will be asked this winter to appropriate $3,000,000 to erect a mill for manufacturing armor for warships, though there are now two plants in this country equal to the capacity of the proposed mill, and the demand for armor will probably not keep the proposed mill running half of the time. The prices paid to the Bethlehem and Carnegie companies were high enough to remunerate those companies for erecting the necessary machinery, which is almost or wholly useless for other purposes. Investigation by the Navy Department showed that $400 would be a fair price, and a Senate Committee reached the conclusion that a lower figure would be enough. At $400 a ton the Bethlehem and Carnegie companies were willing to make contracts; at any rate, they were willing to reduce the prices substantially.

But the Illinois Steel Company represented that it could make armor for $240 a ton, and it secured the introduction of a bill making that figure the limit. Congress did not quite take the company at its word, but it did limit the price to be paid to $300. The Bethlehem and Carnegie companies refused to make armor for this price, and the Illinois Steel Company explained that it had no plant for the production of armor plates, but it would erect such a plant if it had an exclusive contract for all armor for 20 years, the minimum amount to be taken annually being 6,000 tons.

The Illinois Steel Company had procured the fixing of the price below what the other two companies would accept, and it had no means of doing the work itself, and a naval board has been figuring on a government mill. This mill is to produce 6,000 tons a year, the minimum stipulated for by the Illinois Steel Company. As that will cover more than two battleships, and we trust we are not going to build two battleships every year, this factory would lie idle much of the time. The Navy Department knows very well that it costs vastly more to build a ship in a government yard than it does in a private yard, and after the government has spent $3,000,000 in erecting an armor mill, which will be idle half the time, it will find that its armor costs it a good deal more than the Bethlehem and Carnegie companies asked.—*Journal of Commerce.*

Automatic Semaphore Block Signals on the Illinois Central.

As recently announced in the *Railroad Gazette*, the Hall Signal Company has furnished for the Illinois Central a large number of automatic block signals, which are to be operated by electric motors, a ⅛-H. P. motor for each signal. Exposed semaphores are used, of standard size, and distant, home and starting signals are provided at each station. The signals stand normally at danger, approaching trains clearing them, if the track is clear, by means of a preliminary track circuit, which the wheels shunt at a point some distance before reaching the distant signal. From information furnished by Mr. W. J. Gillingham, Signal Engineer of the road, we now give some further particulars concerning these signals, with a diagram of the electric circuits by which the signals are automatically moved by the passage of trains.

That portion of the Illinois Central Railroad lying between Carbondale and Cairo, 57 miles long, a part of the St. Louis Division, is an extremely busy line. It is the throat, so to speak, through which passes the traffic between the Chicago, Amboy and St. Louis Divisions on the north and all the lines of the company south of the Ohio River. Until 1896 all this traffic was done on a single track, but the difficulties of operation became so apparent that a second main track was laid between the points mentioned. Most of this line lies in a spur of the Ozark Mountains extending diagonally from northwest to southeast through the southern part of Illinois. The sharpest curves and steepest grades are between Dongola and Bosky Dell. The gradients and curves are shown on the accompanying diagram, Figs. 1 and 2. On this section automatic block signals are now in use between Cobden and Makanda, and they are being put in from Cobden to Dongola on the south and from Makanda to Bosky Dell on the north, a total distance of 28 miles.

After careful deliberation it was decided to use the standard semaphore and fittings, identical with those used in interlocking practice, except that certain modifications were made to reduce friction by the introduction of ball bearings. In 1894 the Illinois Central had erected in Chicago an automatic electric semaphore signal (which is still in service) for the purpose of experiment and to determine the reliability and efficiency of an exposed semaphore signal worked by an electric motor (fixed to the signal post). The signal is located on the lake shore where it has been subject to all conditions of weather, and as a result of those tests the company decided to adopt this type on the St. Louis division.

The signals are located with special reference to the grades, so as to make it as easy as possible for trains to start after having been stopped at a signal; the uniform length of blocks being made secondary to this. The locations having been thus determined on the plan, the next step was to make the ground locations with reference to the line of vision, bearing in mind the grades. In determining these locations the division officers and the signal department co-operated; and it is of interest to note that in no instance was it necessary to vary a signal more than 200 ft. from the original location; and there were but four instances where the home signals could not be sighted from a good distance. As previously stated, the blocks are not of equal lengths, but at the stations and at all groups of switches, both home and advance ("starting") signals have been provided, the home signals permitting trains to pull into stations to work when the block in advance is occupied. The advance signal is placed far enough ahead of the switches to permit the longest train to do switching without delay when the next succeeding block is occupied.

The complete application, extending from Bosky Dell to Dongola, consists of 56 signals electrically operated and controlled, all of the standard semaphore type. The accompanying diagram, Figs. 3 and 4, showing the arrangement of circuits and locations between Cobden and Makanda, illustrates the plan followed throughout the entire application; but the complications are such that a diagram of a single block is shown in Fig. 5, which, with the explanation appended, will make the arrangement easier to understand.

Each block section is provided with a distant and a home signal and at stations there is also an advance signal. Each switch is provided with a vibrating bell. The signals being normally in the caution and stop positions, a train approaching the distant signal will, upon entering the preliminary section (assuming that the block in advance is unoccupied), clear the advance, home and distant signals. Where switches are located in the block the vibrating bell sounds simultaneously with the entrance of the train on the preliminary section. If, however, the block controlled by the advance signal is occupied, the signals are not cleared by the train on the preliminary section, but upon the train passing the distant signal the home signal clears and the bells sound.

The application of vibrating bells at switches was first made on the Chicago terminal of the Illinois Central. While it is true that theoretical objections have been made to their use, from a practical standpoint they are believed to be more efficient than visual indicators, not only because they more effectually arrest the attention but because they give indication or warning to a greater number of trainmen. Instructions governing trainmen using main line switches within the block system are very explicit. They are not permitted to move a switch for the passage of a train from a side track to the main track or from one main track to the other when the bell at such switch is sounding, nor to proceed after reversing a switch for a siding unless the bell begins to ring when the switch is turned. It is apparent, therefore, that if on opening a switch the bell does *not* sound, there is necessity for extra precautionary measures, and the trainmen are governed accordingly.

The apparatus for operating the signal directly necessarily differs from that operating disk signals, but it is of simple construction, and the likelihood of failure to perform its function is very remote, in fact is no greater than with disk signals.

The distinctive features of these signals are the method of bonding the rails for track circuit, the vibrating bells

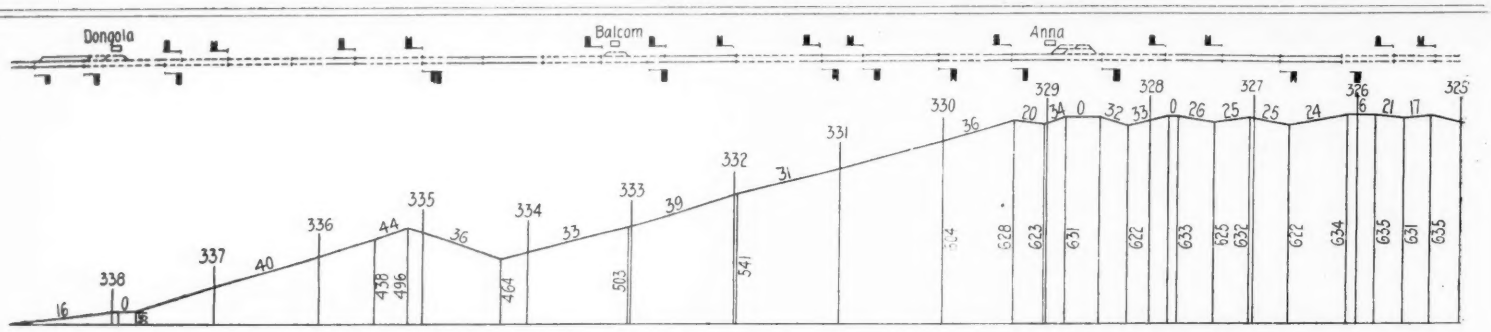
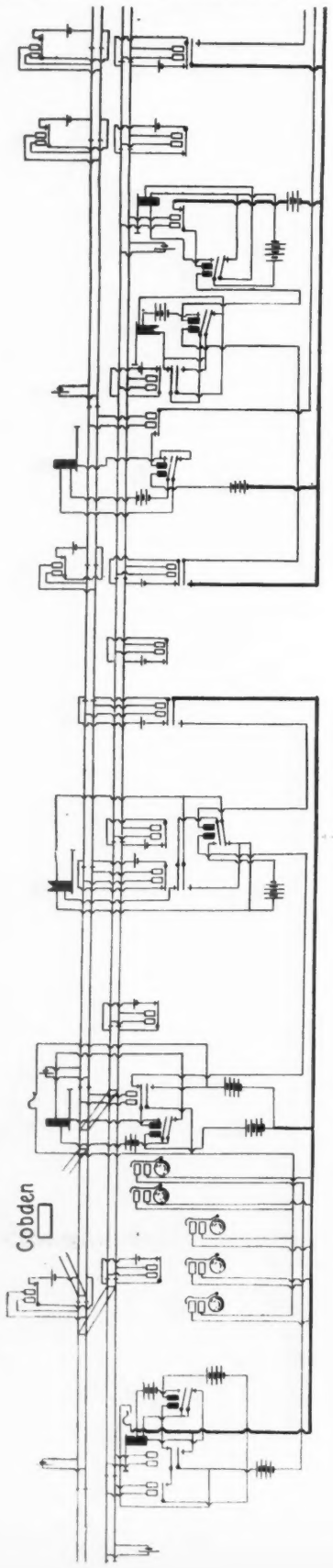


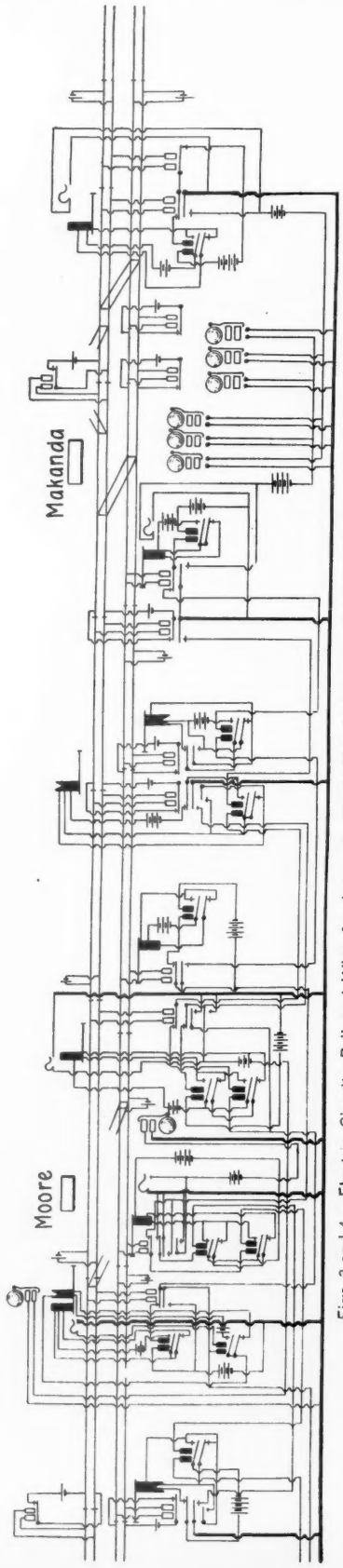
Fig. 1.—Profile and Diagram of the Line of the Illinois Central Railroad from Dongola to Bosky Dell, 28 miles—*Continued in Fig. 2.*

NOTE.—In the diagram each line represents a track; solid lines represent tangents and dotted lines curves.

at switches, and the manner in which the semaphores are operated. Until quite recently the practice has been to bond the joints by fastening the wires to the base of rail; but this has not proved altogether satisfactory, for the reason that bonds are sometimes forced out or broken, either by contact with the ties or by shearing off by the spikes in consequence of creeping of the rails. So much trouble was experienced from the latter cause on the approaches to the Cairo Bridge that it became necessary to provide some other form of bonding. The method now pursued both on the bridge and on the St. Louis division is to bond through the web of the rail, using two wires, in substantially the same manner as that employed on electric street railroads. It obviates entirely the troubles experienced in the other method, and reduces the cost of replacements.

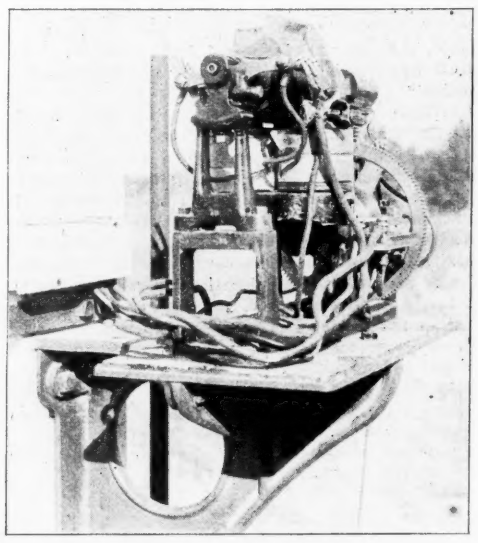
In the operation of the semaphore a one-sixth horse power motor is used, the power necessary to operate it varying (according to the resistance of circuit) from 10 to 16 cells of Edison-Lalande type S battery. The motor, as will be seen from the illustrations, is fastened to the side of the signal post, directly above the counterweight lever. Attached to this lever is a stranded cable ¼ in. in diameter, the other end of which, extending upward to the motor, is fastened to a drum keyed on to a shaft geared into the armature shaft as 25 to 1. The drum shaft is provided with a worm into which is geared a circuit-closing device for controlling the motor and brake circuits. On one end of the armature shaft is fastened a soft iron circular disk which, in connection with a high resistance coil, acts as a brake to stop the motor, there being lateral movement enough in the shaft to permit of the disk being attracted and held by the brake coils when they are energized. On the base supporting the motor are insulated strips forming a part of the circuit-closing device. The action of this circuit-closing device is such that when the block is unoccupied and no train is in the preliminary section the battery is on open circuit. When a train enters the preliminary section a circuit is automatically closed through the motor, which thereupon causes the signal to assume its clear position. Just before the signal reaches the clear position, the motor circuit is automatically broken, and a circuit is closed through the brake magnet coils, causing a retardation of the movement of the arm and bringing it without undue shock against the stop, where it is held by the brake magnet. In this connection it should be understood that the circular disk is never in contact with the brake magnet poles, the brake being purely magnetic and not a friction device. Thus there is no possibility of sticking due to residual magnetism. The signal remains in the clear position until the first wheels of the train pass the signal, when the brake magnet circuit is broken and the signal returns to the stop position; its speed, however, being retarded just before the signal arm reaches the stop by the counter current developed in a circuit at that time automatically closed through

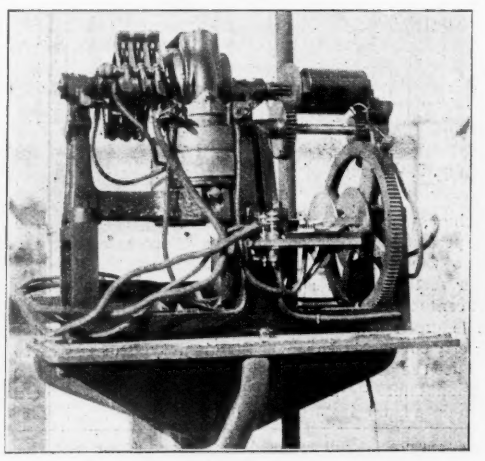




Figs. 3 and 4.—Electric Circuits, Rail and Wire, for Automatic Block Signals, between Cobden and Makanda—Illinois Central Railroad.

The right-hand end of the upper diagram joins the left-hand end of the lower.





Figs. 8 and 9.—Side and End Views of Motor for Working Automatic Semaphore Signal.

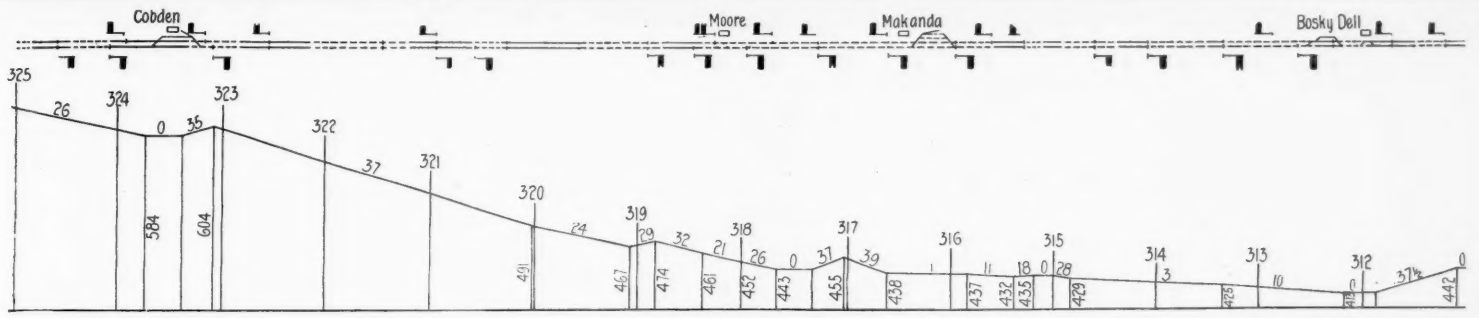


Fig. 2.—Continuation of Diagram Shown in Fig. 1.

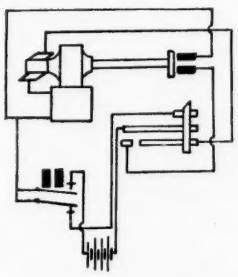


Fig. 10.—Wiring of Electric Motor.

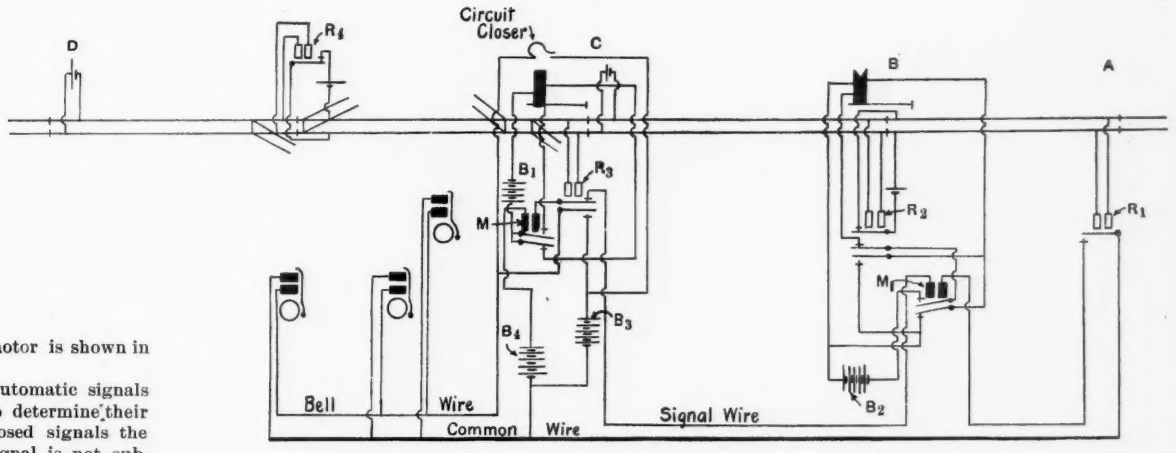


Fig. 5.—Electric Circuits for Automatic Signals for one Block Section.

the motor only. The wiring of the motor is shown in Fig. 10.

In considering the application of automatic signals generally, the important question is to determine their reliability and efficiency. With enclosed signals the apparatus directly controlling the signal is not subjected to wind, rain or snow, and the question of a normally danger or normally clear system becomes one of individual preference. With semaphores, however, the conditions are changed, and it becomes a matter of expediency that the signals be normally at danger. The actual time a signal is in the clear position (for train movements) is very much less than in the danger position (this will vary with volume of traffic); but assuming it to be relatively as one to five, the failure of apparatus should be on the side of safety, and the tendency of the signal arm to stick in sleeting or snowy weather is certainly greatest in the position at which it is the longest time at rest, and in contending against such possibilities, it must be remembered that the failure to move from the stop or danger position is safe, while failure to move from the clear position is likely to be unsafe. It may be argued that the danger of failure is remote, but whether this be true or not the principle of keeping signals normally at danger is correct, and it presents no obstacle to economical and successful operation.

Number 8 E. B. B. iron wire is used for the line on the telegraph poles, and all batteries are placed underground; those for the track circuit in cast iron chutes and for the motors and switch bells in cedar tubes specially made for the purpose.

The cost of maintenance and operation of these signals, so far as it has been possible to judge from experience thus far, will be but little if any greater than that of disk signals.

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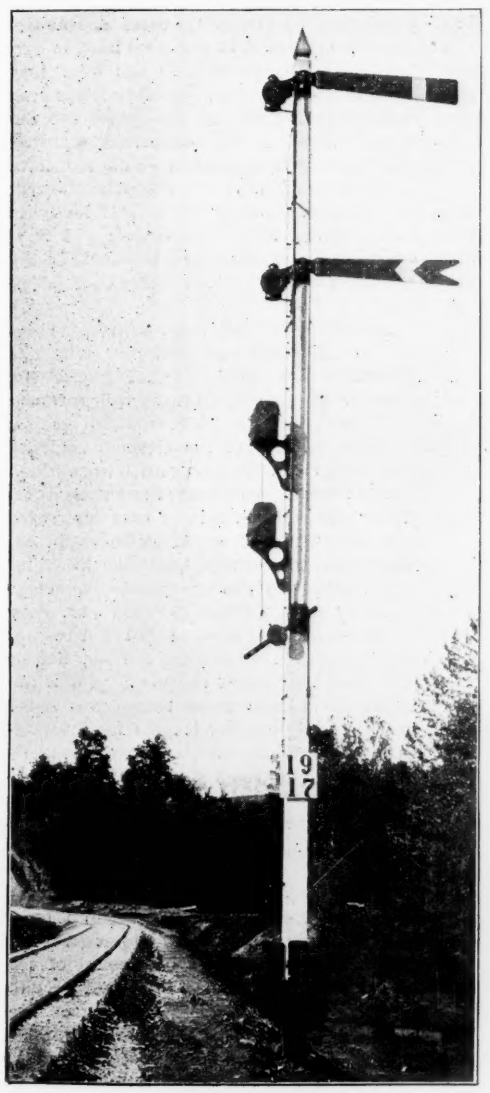

Fig. 6.—Automatic Semaphore Signal—Illinois Central Railroad.

EXPLANATION OF DIAGRAM, FIG. 5.

A B, B C, C D are sections of track constituting a block with its distant signal and preliminary circuit. R_1, R_2, R_3, R_4 are track relays; M and M_1 are relays directly controlling the motor circuit; B_1 and B are the batteries operating the motors, B_3 is the battery for operating the bells, and B_4 is the battery for operating the relays M and M_1. All the track relays are normally closed and the relays M and M_1 are normally open. The entrance of a train on the section $A B$ shunts the track battery from track relay R_1, closing the path for battery B_4 through back contact point of relay R_1 and thus energizing relays M and M_1. The energizing of relay M closes the front contact on that relay, thus completing the circuit for battery B_1 through this contact and the home signal motor, thus pulling this signal to the clear position. A similar result follows with relay M_1, battery B_2 and the distant signal. When the home signal is in the clear position a circuit is closed through the circuit closer, battery B_3 and the bell magnets, causing the bells to sound at all switches in the section of track controlled by this signal. When the train enters the section $B C$, relay R_2 is demagnetized and the distant signal arm resumes the horizontal position, this being effected by the breaking of the circuit for battery B_2 through the opening of the front contact of this relay. The train entering section $C D$ demagnetizes relay R_3 and the home signal resumes the stop position by reason of the breaking of the circuit of battery B_1 through the opening of the circuit through relay M, which is effected by the opening of one of the contact points on relay R_3. It will be noticed that the home signal is in the stop position and the circuit closer open; but the bells will continue to sound as long as the train is in the section $C D$ because a circuit is completed through the back contact point of R_3, battery B_3 and the bell magnet coils. When the train passes out of section $C D$ all apparatus is restored to the normal position.

If, at the time a train passes A the block $C D$ is occupied by a preceding train or car, or a switch is open, the demagnetization of R_1 by the action of the wheels has no effect on relays M and M_1, for the circuit of battery B_4 is held open at R_3 by the preceding train (or car); and consequently the signals remain at danger and stop the train at C.

The lower armature of relay M_1 when down—that is, when in the position that it takes when a train passes it and the signal at B goes to the horizontal position—closes a circuit through the path indicated by the line shown at the underside of the arm of signal B. This circuit, which has no battery, runs through the motor, and the office of the lower armature of relay M_1 is to close a circuit through the motor, outside of the motor battery, and thus aid in retarding the motion of the signal arm as it approaches the end of its stroke. The relation of relay M_1 to the motor is shown in Fig. 10. Relay M has connections to its motor similar to those of relay M_1.

f, while a train is between B and C, a following train

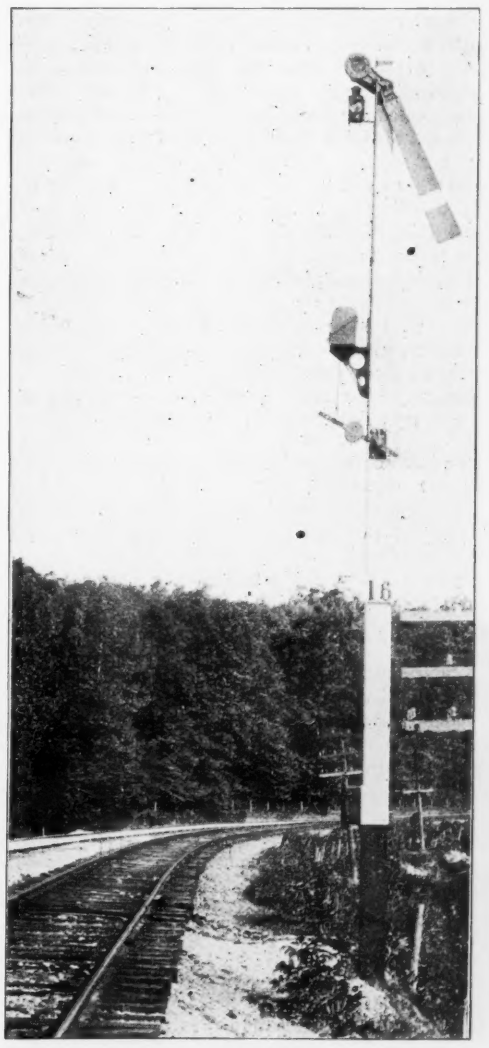

Fig. 7.

should pass A, this second train, by holding M_1 closed, would prevent the closing of the no-battery circuit described in the preceding paragraph; to avoid this the dropping of the third armature of R_2, which is effected by the presence of the first train in the section $B C$, is made to close the no-battery circuit around M_1.

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The Chief Engineer who writes on another page suggests that perhaps cars do not ride quite as easily on the modern stiff track as they did over rails of lighter section, and he further suggests that perhaps the mechanical department can help matters by a better system of springs. Of course we defer to his judgment and experience, but from our own observation the first premise is wrong, and we are disposed to think that there is less motion on the stiff track than there was on the lighter track. However this may be, it seems reasonable that a rigid and smooth track will be found the easiest to maintain—less destructive to itself, to machinery, to rolling stock and to the person of the passenger. The oscillations will be less frequent and much less ample, and all the train of consequences, in blows and in irregular strains that cannot be analyzed or provided for, will be less. Further, we have direct evidence that the work done in hauling a fast train is less on a stiff track than on the lighter track. Mr. P. H. Dudleys' now well-known experiments showed this. It follows, then, that we do not want an elastic track, but a smooth track, and a track as rigid as it can possibly be made; but it follows, further, that the burden of giving ease to the load is transferred to the mechanical department, where it belongs. There known springs, acting at times and in ways that are known, can be accurately contrived. What could be less scientific than to try to put springs in your track?

A valued correspondent has written to us concerning our comment (*Railroad Gazette*, Nov. 5, page 780) on the appointment of Prof. Henry S. Pritchett as Chief of the United States Coast Survey. It may be remembered that we agreed that he is an able man and that he is probably competent for the place; but we judged that it might have been better to appoint somebody already in the Survey, and we added that we had heard that there was an organized and well conducted boom carried on in his his interest to procure the appointment. Our correspondent, who is in a position to know a good deal about the subject, and whom we trust thoroughly, says that politics had absolutely nothing whatever to do with the appointment. Mr. McKinley left the whole matter to Mr. Gage and Mr. Gage tried to find just the right man. A very careful canvass was made by the aid of outsiders, who may be considered in some degree experts, and the upshot of the matter was that the opinion of those best qualified to judge, taking into consideration the various candidates and various men who were not candidates, and all the conditions, was that Professor Pritchett was altogether the best man available. Our friend says that he is a man of resource, he is quick to see the utilitarian side of scientific work, energetic, fearless, absolutely honest, of pleasing personality and of considerable persuasive power. It is believed that he will do as much as any man possibly could to take the Survey out of politics and to put it on a sound, scientific and utilitarian basis. Certainly, we shall do what little we can to help along so good a man in an undertaking so praiseworthy.

Growth of Business.

The general business situation necessarily attracts the anxious attention of the whole community. After a series of lean years, when the chief hope was that hings might get no worse, and that one might survive till there should come a turn for the better, the turn for the better has certainly come, but it leaves business men still anxious as to the extent and continuance of the improvement. The first effect of confidence in improvement we have seen in a great rise in the prices of railroad and some other securities, founded on increased earnings, themselves founded chiefly on larger returns from farm products and the resulting stimulus to other industries.

But so far there are few signs of what has usually followed quickly a change from bad to good times—great activity in *extending* industrial enterprises, the building of new railroads, and the establishment of new and the enlargement of old manufacturing establishments. For the continuance of healthy progress it is of the utmost importance that such increases in capacity for production should not be undertaken until it is reasonably certain that the country can consume the increased produce; and this means that the new ones are not needed until the old ones are fully occupied. Evidently we have not got to that point yet, nor does it yet appear that we shall soon reach and pass it; otherwise there would be an army of promoters seeking capital in the money market and asking contractors and manufacturers of machinery for estimates on buildings and plants.

Now it is this very extension of industries which has much to do with the demand for manufactures. Evidently the rail mills and the locomotive and car works cannot have so much to do when they are required simply to maintain the existing railroad system as when they have not only to maintain it but also add 10,000 miles or more to it yearly, as in several past years they have had to do. It is not generally appreciated that this is true also of other industries; the building of new blast furnaces, rolling mills, machine shops and other manufactories makes a tremendous demand on the industries already established. Before the end of a period of prosperity the country has usually been overstocked with them, and the reaction, always most severe in rapidly growing countries, is the greater because of the sudden annihilation of the demand for extensions.

Now the possibility of the growth of most industries in this country is limited by the home consumption. When a very large part of our consumption of rails, for instance, was supplied by foreign mills, it was possible to double the capacity of our rolling mills every few years; now that for some years the home mills have been able to supply more than the largest consumption for new roads as well as maintenance, the capacity of rail mills is likely to be extended only in proportion to the increase in home consumption. In production of pig iron we have only just caught up with the home consumption, and further increase in that can only keep pace with consumption plus exports, which latter will have to be fought for. These are only types of many other industries; as soon as they have reached the point when they can fully supply our market there is a sudden check in their extension. Doubtless many of these in time will be able to compete in the world's markets, as some of them now do, but progress in that direction can rarely be as rapid as in supplying the home market, especially when protected against foreign competition.

This, it seems, is likely to make progress in this country less *violent*, as it were, than it has been in the past. But if business does not grow by "leaps and bounds" when it is improving, neither is it likely to fall off in the disheartening way that caused such loss and suffering in 1893 and 1873 and succeeding years. We shall only be the better off if the high tide which leads to fortune rises less, provided the low tide which leads to ruin falls less.

It is notable that though the increase in railroad earnings of late months has been important in some parts of the country, including those where new construction was recently most active, there is so far very little talk of building new lines; and under the circumstances, this, we think, is unprecedented. It is, however, an excellent sign. The hundreds of millions of dollars that were spent on new lines and extensions in the Northwest about ten years ago, for the most part without bringing any addition to the profits of the companies which built them, may at last begin to make some return; but it is not desirable for the railroad interest or the public interest that there should be any further such waste of capital.

So far as appears now, the chief field for new railroads is in what in Germany and Italy take the form of light or "secondary" railroads, and in this country at present chiefly of electric street railroads, the field for each one of which requires more careful consideration than usually it gets before its construction is decided upon. But this is a very big country, and there is and will long remain a field for the construction of new lines and branches, not to speak of the improving of old lines by second tracks and sidings, reductions in grade and the replacing of light by heavy and permanent structures, etc. Such work on our vast network of 185,000 miles may well greatly exceed in cost, and still more in efficiency, the construction of lines wholly new.

An Epidemic of Accidents in Germany.

There has been an epidemic of railroad accidents in Germany of late months which has led to numerous very severe criticisms in the press concerning almost everything connected with the railroads and their management. On the part of the administration it is retorted that most of the criticisms have an insufficient basis or none whatever, and in many cases this is shown; for the newspaper criticisms there, as in some other countries that we have heard of, are very often made by men innocent of any knowledge of railroads or the art of working them.

At this distance it is impossible even to guess at the actual cause of the recent frequency of accidents; but it is extremely difficult to charge it to the ignorance, negligence and incapacity of the railroad officers, for the simple reason that they are the same men, for the most part, who have been working them for years past, and who from the results of their service had won a reputation as extremely careful, conscientious and intelligent men. Most of the criticisms are aimed at the Prussian State Railroad administration, which works by far the largest system in Germany and has most of the lines with very heavy traffic. It is doubtful if there is any body of railroad officers in the world so well informed as these, taken as a whole. The administration certainly takes more pains than any other known to us to learn the best railroad practice in different parts of the world. From knowing to doing is a great step, certainly, and the rest of the world has not usually looked to Germany for models of practical efficiency in most industries, though it has made vast progress within the last fifty years. But carelessness and negligence have never been German characteristics.

We are accustomed in this country to epidemics of railroad accidents. In reviewing these causualties we often have had occasion to point out how, in certain months or seasons, the number has been very much greater than the average, and often it has been impossible for us to find any sufficient cause for the great increase. The German authorities say that very many of the recent accidents would not have occurred if the regulations had been strictly followed. A lapse in discipline, however, seems less likely in Prussia than in almost any other country; and it is especially difficult to see why discipline should be any looser now than it used to be; but we cannot judge of that here.

The German railroad officers seem to be more sensitive than ours to newspaper criticism, which is perhaps natural in view of the fact that they are the direct servants of the public. But our railroad men will probably recognize the picture which one of them gives in the *Journal* of the German Railroad Union of the methods of newspaper criticisms, which he says, if well founded, would leave but these alternatives: Either the railroad officers have no desire to manage the business as it ought to be managed, or their ignorance of general questions affecting operation and safety is simply monstrous. They don't know how a station should be laid out, they don't know how the rolling stock should be fitted up, nor how much work the employees can do, nor in fact anything that they ought to know. "But if the railroad officers don't know these things, who does? The public? Certainly not, for it gets its information from the press. So the men who know must be the people who write for the newspapers." This writer, however, doubts if these newspaper men can know everything by inspiration, and thinks they must go to practical men for information before they pass final judgment. Here the newspaper man finds difficulty. To go to the railroad officers would be to look for evidence to the very men who are to be tried and condemned. So he resorts to the lower grades of employees, who for the most part, on account of the limited range of their duties, have no opportunity to understand the connection between the various services and appliances, and therefore are likely to form erroneous ideas as to the causes of accidents; while their judgments may not be founded on the facts in the case. Subordinates not unseldom think that they know better than their superiors. Almost any switchtender, if pressed hard, feels obliged to confess that

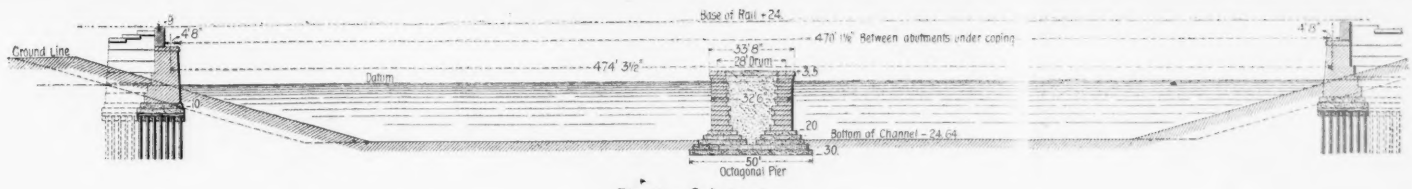


Fig. 1.—Substructure.

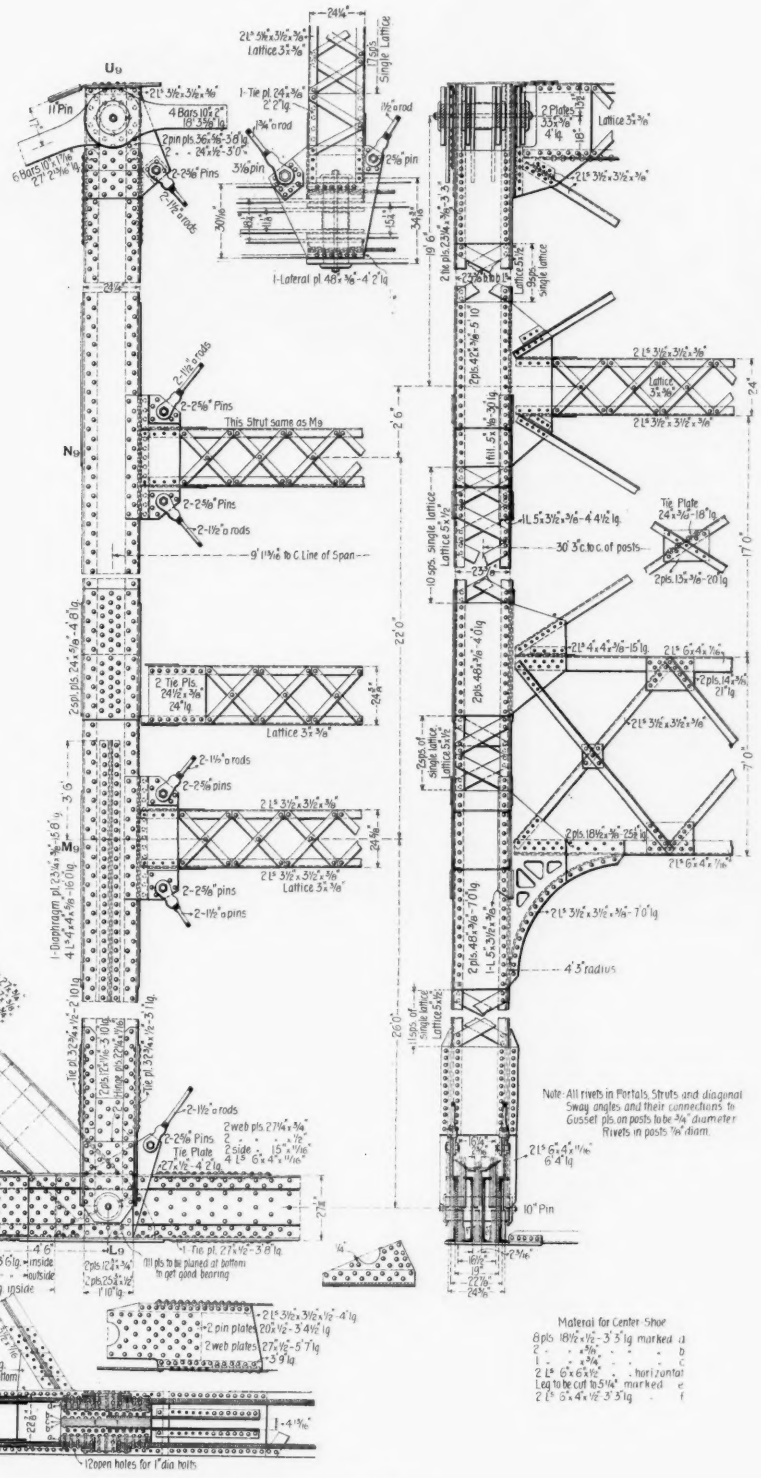


Fig. 3.—Details of Post U_9L_9.

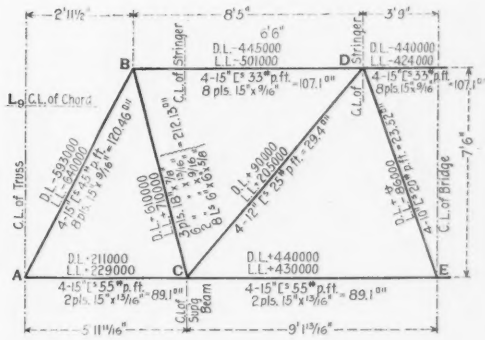
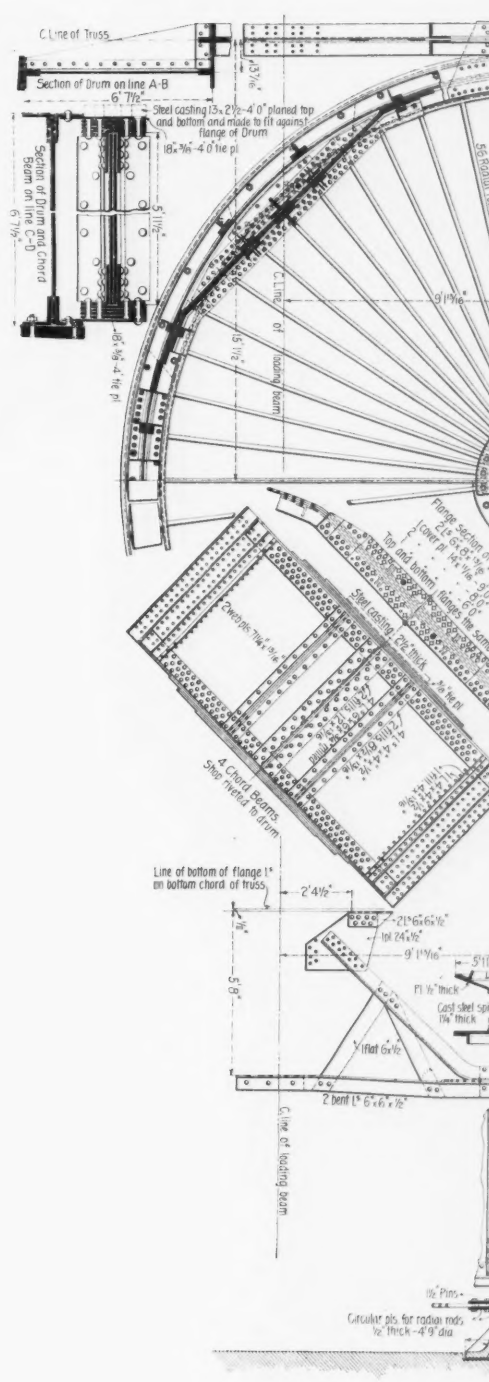


Fig. 2a.


C Line of Truss
Section of Drum on line A-B
Steel casting 13 x 2½-4'0" planed top and bottom and made to fit against flange of Drum
56 Radial rods 1¼" dia.
Flange Sections of Chord Beam
Steel casting 2¼" thick
4 Chord Beams Shop riveted to drum
Line of bottom of flange 1" on bottom chord of truss
Cast steel spider 1¼" thick
1 flat 6"x½
2 bent 1" 6"x6"x⅞"
C Line of Loading Beam
1½" Pins.
Circular pls. for radius rods ½" thick-4'9" dia

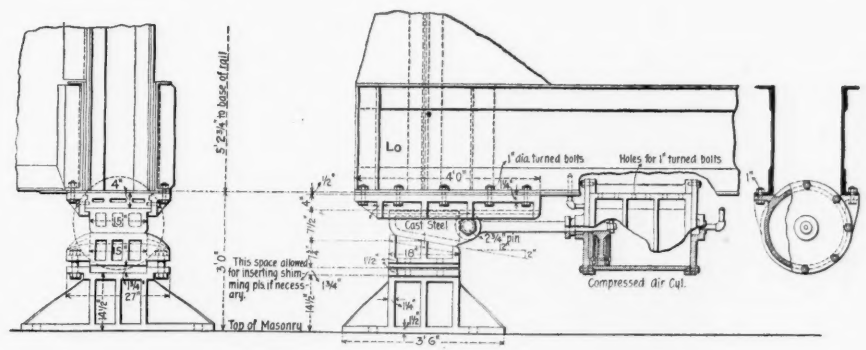


Fig. 4.—End Lift.

Fig. 6.—Drum and Trac

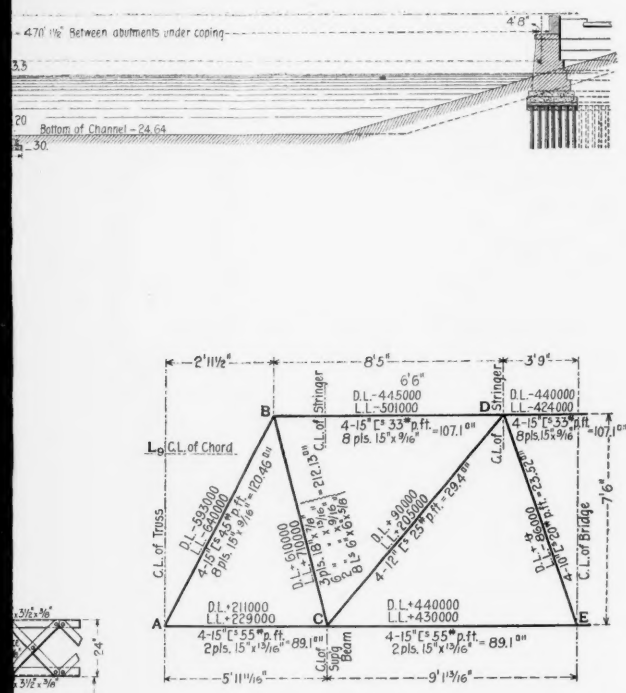


Fig. 2a.

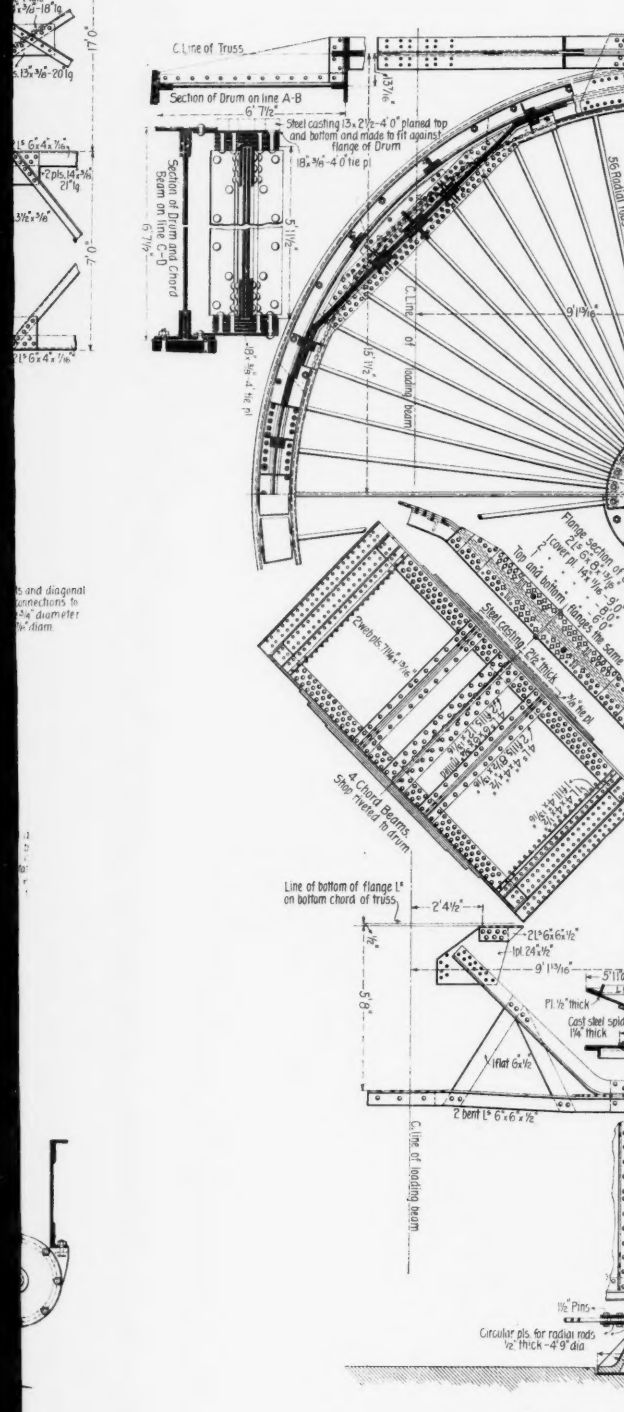
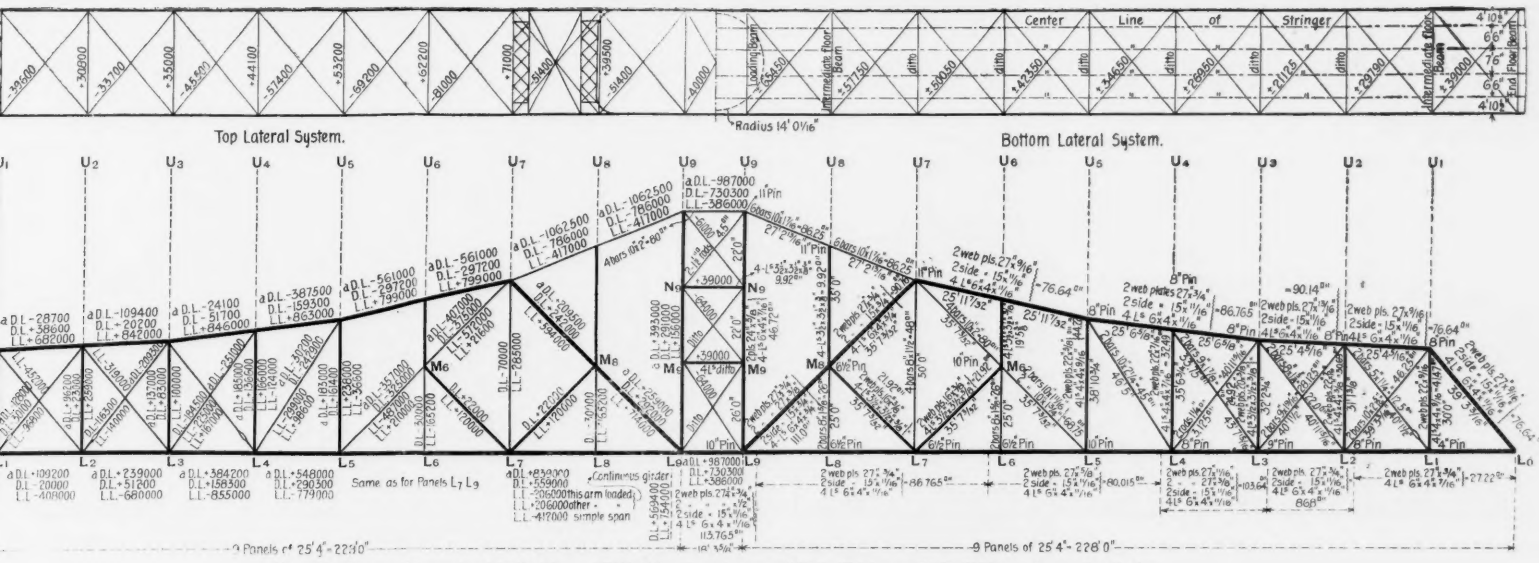

C. Line of Truss
Section of Drum on line A-B
Steel casting 13 x 2½-4'0" planed top and bottom and made to fit against flange of Drum
56 Radial rods 1½" dia
24 Radial Struts
C. Line of loading beam
Section of Drum and Chord Beam on line C-D
Flange section of chord beam
Top and bottom flanges the same
Anchor bolts 1½" dia. 24" long
Radius on center line of Drum
Rad of Pitch line of Rack
Rack in three 120° lengths
Line of bottom of flange L⁸ on bottom chord of truss
2'4½"
5'8"
5'11" dia. for circular pls and L⁸
Cast steel spider 1¼" thick
42" dia
½" Bronze bushing
2 bent L⁸ 6"x6"x½"
Circular pls. for radial rods ½" thick - 4'9" dia
1⅛" Pins
C.S Track
C.I. Base

Fig. 6.—Drum and Track.


Top Lateral System.
Bottom Lateral System.
Center Line of Stringer
Radius 14' 0 1/16"
Same as for Panels L7 L9
Continuous girder
9 Panels of 25' 4" = 228' 0"

Length of span: 18 panels at 25 ft. 4 in. = 456 ft. 0 in., 1 center panel 18 ft. 3 5/8 in. = 474 ft. 3 5/8 in., c. to c. of end pins.

Conditions of loading:

Dead load: 5,320 lbs. per lin. ft. of bridge, ends touching and ends raised 2 in. Total deflection assumed, 6 in.

Live Load: Continuous girder, 4,940 lbs. per ft. of truss, moving from L_0 to L_9 on near track.
4,200 " " " " " " " far "
Simple span, 4,940 " " " " " L_0 to L_9 " near "
4,200 " " " " " L_9 to L_0 " far "

Continuous girder of 4 supports, with equal moments at center supports.

Intermediate floorbeams, max. moment live load = 1,343,000 ft.-lbs. — 1 web plate 59¾ in. by ⅜ in.; 4 angles 6 in. × 6 in. × 1 1/16 in.; 4 flats 6 in. × ⅜ in.
" " dead load = 181,000 "

" end shear live load = 165,200 lbs. — 1 cover plate 14 in. × 7/16 in., 15 ft. 0 in. lg. } On top.; 1 " " 14 in. × 9/16 in., 23 ft. 9 in. lg. }
Dead load = 22,800 " — 1 " " 14 in. × 9/16 in., 18 ft. 6 in. lg. } On bottom.; 1 " " 14 in. × 11/16 in., 25 ft. 0 in. lg. }

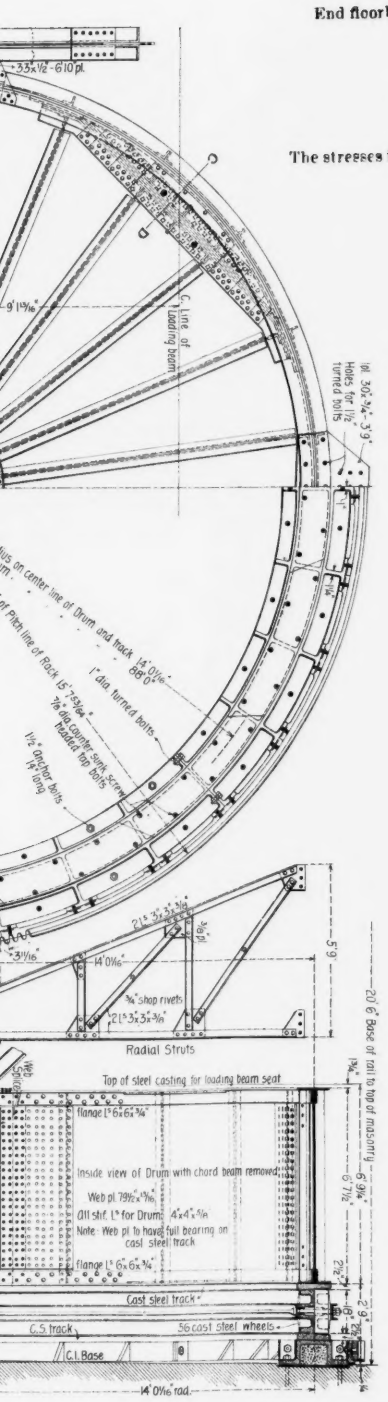
End floorbeams, max. moment live load = 1,044,000 ft.-lbs. — 1 web plate 59¾ in. × ⅜ in.; 4 angles 6 in. × 6 in. × 7/16 in.; 4 flats 6 in. × ⅜ in.
Dead lead = 118,000 "

Max. end shear live load = 128,200 lbs. — 1 cover plate 14 in. × 7/16 in., 14 ft. 6 in. lg. } On top.; 1 " " 14 in. × 9/16 in., 27 ft. 9 in. lg. }
Dead load = 13,800 " — 1 " " 14 in. × 9/16 in., 18 ft. 6 in. lg. } On bottom.; 1 " " 14 in. × 5/8 in., 25 ft. 0 in. lg. }

Stringers, max. moment live load, 336.500 ft.-lbs. } 1 web 51 in. × 3/16 in.
Dead load, 31.700 " }
Max. end shear, live load, 59,800 lbs. } 4 angles 6 in. × 4 in. × 9/16 in.
Dead load, 5,000 " }

The stresses in the longitudinal bracing in center panel were calculated to transfer a shear across this panel due to an unbalanced load of 12,000 lbs. suspended from one end of bridge only. Section of drum: 1 web plate 79½ in. × 13/16 in., and 4 angles 6 in. × 6 in. × ¾ in.

Fig. 2—Strain Sheet.


Line of Loading Beam
Radial Struts
Top of steel casting for loading beam seat
Inside view of Drum with chord beam removed
Cast steel track
56 cast steel wheels
C.I. Base
14' 0 1/16" rad.

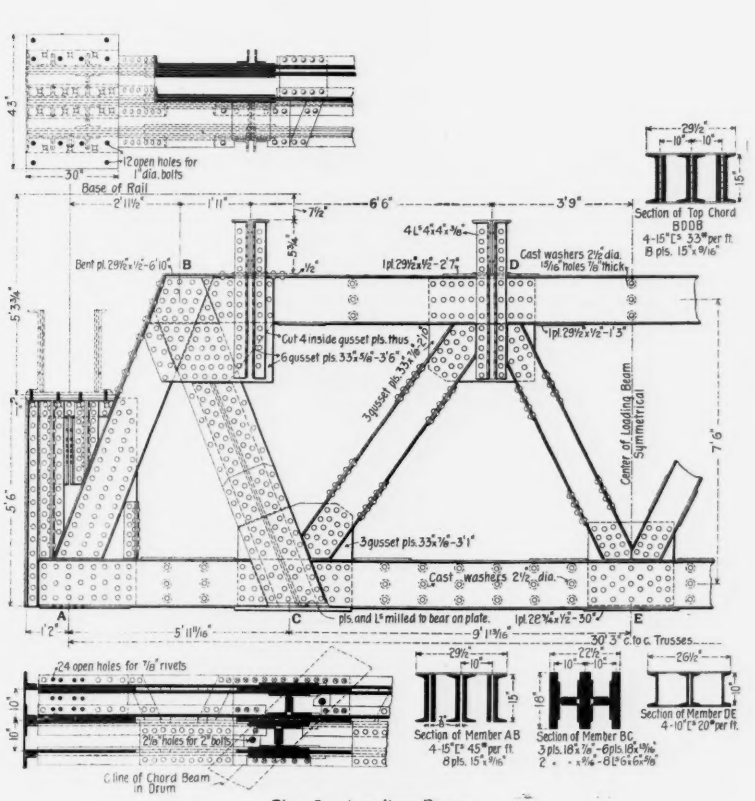

12 open holes for 1" dia. bolts
Base of Rail
Bent pl. 29½" x ½" - 6' 10"
Cut 4 inside gusset pls. thus
6 gusset pls. 33" x 5/16" - 3' 6"
3 gusset pls. 33" x 7/16" - 3' 1"
Cast washers 2½" dia.
pls. and Ls milled to bear on plate.
1 pl. 29½" x ½" - 1' 3"
1 pl. 28¾" x ½" - 30"
Center of Loading Beam Symmetrical
30' 3" c. to c. Trusses
24 open holes for 7/8" rivets
2⅛" holes for 2" bolts
C line of Chord Beam in Drum
Section of Top Chord BDDB
4-15" [s 33.9# per ft.
8 pls. 15" x 9/16"
Section of Member AB
4-15" [s 45.8# per ft.
8 pls. 15" x 9/16"
Section of Member BC
3 pls. 18" x 7/8" - 6 pls. 18" x 5/16"
Section of Member DE
4-10" [s 20.0# per ft.

Fig. 5.—Loading Beam.

DETAILS OF SWING BRIDGE FOR THE CHICAGO, MADISON & NORTHERN RAILROAD OVER THE MAIN DRAINAGE CHANNEL OF THE SANITARY DISTRICT OF CHICAGO. SPAN, 474 FEET 3⅝ INCHES.

his superintendent knows nothing about running trains; questioned by a reporter, who recognizes him as an expert witness, perhaps he adds, confidentially, that the whole management is rotten. Such evidence as this, to which more weight is given than to the assurances of the responsible head of the management, forms the basis of many a condemnatory article; and though afterward it may be shown ever so clearly that there was no fault in the management, some of the mud sticks.

This is very discouraging to railroad officers. In Germany the employees have been especially ready to charge the officers with overworking the employees, and the average newspaper man is shocked to learn that a switchman perhaps has been on duty for 17 hours, his informer neglecting to tell him that within this period were some intervals of two, three, or even four hours, when he had nothing whatever to do. The tendency of these numerous charges of overworking is to demoralize the lower grades of employees, who are thus taught, as it were, that they are excusable if they neglect their duties.

The accidents on German railroads, including all in the empire except those in Bavaria, are reported monthly. In August, the last month reported, on the 24,716 miles reporting, which had a train movement of 18,749,274 miles in the month, there were 35 derailments, 23 collisions, and 158 other accidents due to operation, or 216 accidents of all kinds, an average of 1 to every 114 miles of road and every 86,804 train-miles. These accidents caused the death of 62 and the injury of 162 persons. Of the dead 11 and of the injured 64 were passengers; while 35 employees were killed and 79 injured.

In any comparison of these figures with those collected in this country, it should be remembered that the basis for reporting is very different. The German roads are required to report all accidents, whether they injure any one or not.

October Accidents.

Our record of train accidents in October given in this number includes 91 collisions, 68 derailments and 6 other accidents, a total of 165 accidents, in which 54 persons were killed and 116 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident, as reported, make it of special interest.

These accidents are classified as follows:

COLLISIONS.	Rear.	Butting.	Crossing and other.	Total.
Trains breaking in two	19	0	0	19
Misplaced switch	1	2	2	5
Failure to give or observe signal	1	2	7	10
Mistake in giving or understanding orders	0	4	0	4
Miscellaneous	12	2	4	18
Unexplained	9	12	14	35
Total	42	22	27	91

DERAILMENTS.			
Broken rail	1	Careless running	1
Loose or spread rail	1	Track repairers	1
Defective switch	1	Runaway train	2
Defective frog	1	Open draw	1
Broken wheel	2	Derailing switch	1
Broken axle	8	Animals on track	3
Broken truck	3	Washout	1
Fallen brakebeam	2	Malicious obstruction	2
Broken car	2	Accidental obstruction	1
Broken brakeshoe	1	Unexplained	25
Broken parallel rod	1		68
Misplaced switch	6		
Unfastened switch	1		

OTHER ACCIDENTS.	
Broken side rod	2
Cars burned while running	2
Other causes	2
	6
Total number of accidents	165

A general classification shows:

	Collisions.	Derailments.	Other accid's.	Total.	P. c.
Defects of road	0	4	0	4	3
Defects of equipment	19	19	2	40	24
Negligence in operating	37	13	2	52	31
Unforeseen obstructions	0	7	2	9	6
Unexplained	35	25	0	60	36
Total	91	68	6	165	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other accid's.	Total.
Passenger	16	15	5	36
Freight and other	146	56	1	203
Total	162	71	6	239

The casualties may be divided as follows:

	Collisions.	Derailments.	Other accid's.	Total.
Killed:				
Employees	12	13	0	25
Passengers	2	22	0	24
Others	5	0	0	5
Total	19	35	0	54
Injured:				
Employees	36	25	4	65
Passengers	7	34	0	41
Others	9	0	1	10
Total	52	59	5	116

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. Killed.	Pass. Injured.	Emp. Killed.	Emp. Injured.
Defects of road	0	2	1	2
Defects of equipment	2	21	0	6
Negligence in operating	2	8	14	42
Unforeseen obstructions and maliciousness	0	0	1	4
Unexplained	19	10	9	11
Total	24	41	25	65

Twenty-seven accidents caused the death of one or more persons each, and 34 caused injury but not death, leaving 104 (63 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with October of the previous five years shows:

	1897.	1896.	1895.	1894.	1893.	1892.
Collisions	91	72	60	92	132	96
Derailments	68	62	64	81	116	94
Other accidents	6	7	7	9	12	6
Total accidents	165	141	131	182	260	196
Employees killed	25	27	40	25	45	47
Others killed	29	22	9	19	52	15
Employees injured	65	55	73	107	140	83
Others injured	51	34	100	102	188	79
Passenger trains involved	36	48	40	65	99	62
Average per day:						
Accidents	5.32	4.55	4.19	5.87	8.39	6.32
Killed	1.74	1.58	1.52	1.42	3.13	2.00
Injured	3.74	2.87	4.94	6.74	10.58	5.23
Average per accident:						
Killed	0.33	0.35	0.36	0.24	0.37	0.31
Injured	0.70	0.63	1.18	1.14	1.26	0.82

Of the 24 passengers killed in October, three-fourths are charged to the disaster at Garrison's, N. Y., which has already been reported. The cause of this derailment can be determined only after a thorough investigation, if, indeed, it can then; and although the local coroner, the State Railroad Commissioners and an outside engineer engaged by the railroad company have examined the ground and have taken testimony, no report has yet been made public. The only public hearings have been those of the local coroner, and these have brought out no evidence of importance.

Of the six other passengers killed, but four were on passenger trains.

There was a butting collision between a passenger train and a freight on the Canadian Pacific near Stittsville, Ont., about 5 o'clock on the morning of Oct. 14 in which five or six men were killed and a number of others badly injured. A westbound freight became stalled on a grade before reaching Stittsville and a part of the cars had to be left standing on the main track while the forward part af the train was taken to the station and placed on a side track. After these cars had been set off, the brakeman who should have remained there to stop eastbound trains returned with the engine for the rear portion. He claims to have notified the operator to hold trains, but the operator claims that the brakeman simply said "we had to cut to get in," meaning, as the operator supposed, simply that the train was too long for one siding and that a portion of it had been put on another siding. There was a dense fog at the time and the side track was not visible from the telegraph office. The operator is said to be only 19 years old and to have been employed at that place only a short time.

Near Willow Springs, Mo., on the 4th, a locomotive struck a wagon containing seven persons and all of them were killed; in a similar accident at Indianapolis three men were killed at once. In October we had reports of two cases, in each of which four men walking on the track were killed at a single stroke by a locomotive. Near Lima, O., there was a butting collision of hand cars in a fog, injuring many of the occupants; and near Oldham's, O., a hand car fell off a bridge 45 ft. high, badly injuring six men, two of them fatally.

We have accounts of eight electric car accidents in October, in which 33 persons were injured. Most of these were collisions, but in one case, at Bedford, O., a car was run off a derailing switch at the approach to a railroad crossing. The motorman, in endeavoring to clear a locomotive and save a little time, forgot that there was such a thing as a derailing switch at that place. Of these eight accidents the worst was a derailment at Waterloo, Ia., on the 11th, where a car on the Waterloo Electric Railway, running between Des Moines and Cedar Falls, was thrown from the track on a curve approaching a bridge over the Cedar River. The jolting of the car when it left the track threw the motorman off his feet and in falling he turned on the full current, which sent the car down an embankment, landing it close to the river. Sixteen persons were hurt, and one man was thought to be fatally injured.

The Chicago reporters, discussing the reduction of the fare to St. Paul (from $11.50 to $7), predict a continuance of the war until a rate of $1 shall be reached; and as the reporters get a good deal of their inspiration from railroad passenger men, we may assume that there is a basis of truth for the rumors that some railroads are disposed to take much greater liberties with the long-and-short-haul law than heretofore. Such rumors have come from several places since the Supreme Court's decision in the Troy Board of Trade case, and one freight rate in Joint Traffic Association territory is definitely reported as ignoring the fourth section. And yet the decision has not by any means abrogates the law. As reported in our issue of Nov. 12, page 808, Judge Shiras simply said that the section was "not so stringent or imperative as to exclude in all cases" the consideration of competition as a reason for ignoring the restriction of the section; and that a railroad need not ask authority from the Commission before making rates ignoring the restriction. Every railroad is still bound, if complained of, to show a good reason for rates from A to D lower than those from A to C, and to justify the extent of the differences made. This second point of the decision, that a railroad may decide for itself whether the restrictive clause of the law may be ignored, is the subject of great wailing on the part of those who now spend their time deploring the "emasculation of the Commission," but it is based on an explicit utterance of Judge Cooley himself, away back in the Louisville & Nashville case in 1887, the first important case decided by the Commission. Moreover, Judge Cooley seems to have declared carriers free to pay rebates, although, of course, on peril of the consequences, if it should turn out that the circumstances were not dissimilar; but Judge Shiras in the present decision takes occasion to declare that the right of a carrier to decide for himself whether competition will justify him in disregarding the specific requirements of the law, does not apply to the second section (that forbidding discrimination between persons).

So much for the principles involved. As to the facts in this particular case, the Supreme Court, as is proper in an appellate court, simply declares itself "not convinced" that the lower courts erred. It may be half convinced, or almost wholly, but the lower courts, dealing with the facts at first hand, must have the benefit of any doubt, even if it be a small one. To railroad men, however, the case is simplified by the fact that competition by water was the main element that settled the decision. Railroad competition existed, and its character and importance were discussed, but we find nothing in the decision to justify the conclusion that if railroad competition were the only excuse, the courts would as readily relieve a railroad carrier from the requirement of the fourth section. Justice Harlan's dissenting opinion is not published, but it is reported as being based on the view that the majority are nullifying the intention of Congress. This probably has reference to the proviso of the fourth section authorizing the Commission to give a railroad leave, upon application, to disregard the long-and-short-haul rule; but the fact that, by this proviso, a railroad *may* apply does not by any means compel it to apply. Congress may have meant to compel, but it did not use the necessary words to convey that meaning. The changing of this permission to compulsion is one of the principal modifications in the law that the Commissioners now want Congress to make; and the issues seem to be slowly clarifying. Senator Cullom announces that the proposed amendments to the law will be presented in Congress as early as possible, probably this month, but the prospects, whether of pooling or of any other amendment, seem to be as badly clouded as ever.

The railroad bond market continues strong and moderately active. Current transactions are at the rate of a million and a half dollars, par value, a day. The principal demand is for the best securities. Brokers find difficulty in executing important orders in the less active issues of this class at prices recorded on the last previous sale; this is resulting in a generally higher level. The demand for second class issues is less pronounced, buyers for the most part being investors who are taking their purchases from the street. Similar procedure was very pronounced last spring before the bull market of the summer. The most which can be said of it at this time is that it indicates the growing belief on the part of capital in the soundness of American railroads. Interest centered in the progress of the Rock Island plan, which was announced Tuesday afternoon. There continues to be considerable speculation as to the character of the Union Pacific mortgage. It is stated with some show of authority that the reorganization committee intends to confine the total issue of new 4 per cent. bonds to $87,000,000 and that the amount may not be more than $85,000,000. The sum will take in Kansas Pacific securities of all kinds, including the government debt. The specialties in point of strength and activity during the week were Atchisons, Kansas & Texas 4's and 2ds, Kansas City, Pittsburgh & Gulf 5's, Northern Pacific 4's and 3's, St. Louis & San Francisco 4's, Texas Pacific 2ds, Wabash 1sts, Metropolitan Street Railway 5's and most of the granger issues. Anthracite coal bonds, as a rule, were weak.

The Rock Island refunding plan provides for the issue of a $100,000,000 four per cent. mortgage. Of this amount $61,904,000 bonds will be used to take up outstanding bonds, as they can be called for, or as they mature, and the balance will be used for the purchase of new property and other purposes stipulated in the mortgage. The mortgage will be a first lien on the property except for the priority of $12,100,000 sixes on 736 miles of road, maturing in 1917. Speyer & Company announce that they have bought about $52,000,000 of the new fours. It is understood that with these they will retire the $40,394,000 of extension fives subject to call at any time at 105; $4,500,000 debenture fives, also subject to call at 105, and $5,000,000 of the Chicago & Southwestern firstmortgage sevens, which mature in 1899, a total of $49,894,000 par value. The premiums required in the conversion will swell the amount involved to about $52,000,000. The first mortgage sixes, in amount $12,100,000, cannot be disturbed until they mature in 1917, unless the holders so elect. At the end of the last fiscal year the outstanding bonds of the Rock Island were $62,394,000, bearing a

total interest of a little more than $3,300,000, and the refunding now arranged for will give about half a million a year, or something over one per cent. on the capital stock.

Hearings have lately been held by the city authorities of New York and Brooklyn on the matter of the proposed tunnel of the Long Island Railroad Company under Atlantic avenue, Brooklyn, and under the East River to some point beneath Maiden Lane and Cortlandt street. The reader is aware that this project is designed to give a passenger entrance for the Long Island system into the city of New York, and that it is the purpose of the President and Directors to put on a very frequent and fast electric service. The proposal is to put the tunnel down so far that it cannot possibly interfere with buildings or any other construction, and so far as we can judge, it would be a great public improvement and will do no harm to anvone, unless it may be to some competing trolley and ferry companies. The project seems to be as thoroughly commendable and as entirely unobjectionable as it well could be, and it is greatly to the public interest that it should be facilitated Indeed, no city officer can afford to hold it up without making his reasons absolutely clear to the public.

NEW PUBLICATIONS.

Texas & Pacific Quarterly.—The October issue is the first number of a publication issued by the General Passenger Department of the Texas & Pacific Railway at Dallas called the Texas & Pacific Quarterly. This is the first effort of this kind that has been made, so far as we know, by any of the Southwestern railroads. The little journal contains a good deal of interesting information, both local and general, and shows the marks of intelligent editing.

TRADE CATALOGUES.

Crosby Steam Gage & Valve Co.—The Crosby catalogue for 1897 is a solid, 6 × 9 in., 170 page book, in which are carefully described and fully illustrated the numer ous gages, valves, indicators, regulators and other specialties made by this company. The catalogue will be valued by engineers particularly because of its completeness and accuracy. Special mention should be made of the Crosby mine and draught recorder, which is designed for making a continuous record of the pressure of fluids either above or below the atmosphere, as ordinarily measured in inches of water. It is also useful for special purposes, as for determining and recording chimney draughts. The Crosby indicator, the spring seat valve and the various types of well-known recorders are described at some length. The planimeters and recording instruments, together with instructions for their use, are discussed in the latter part of the book. The closing pages are occupied with letters from well-known engineers and useful tables and a complex index. This last-named feature is sometimes overlooked or disregarded in catalogues of this nature, much to their detriment.

Coal Screens and Washers.—The Link Belt Machinery Co., of Chicago, sends a small special pamphlet showing and describing the link belt, shaking screen and weigh boxes, and the Luhrig patent picking table and patent coal-washing machinery, as made and sold by this company.

American Society of Mechanical Engineers.

(*Continued from page* 849.)

conditions was computed, from which the efficiency of the entire plant, including both engine and pump, was calculated. The paper was accompanied by tables showing the results of various tests and computations when the water was discharged under different conditions.

Mr. William Wallace Christie, of Paterson, N. J., presented a paper on *Boiler Tests: Classification of Data and Plotted Results*, in which he gave by numerous diagrams the results of boiler tests, which have been recorded and by classifying them and plotting these results, determined both the average values and the mean values such as shown in Figs. 3 and 4 The average results are plotted in Diagrams I., II. and III. It is interesting to note that in each of these three diagrams the vertical boiler occupies the lowest and highest place as far as evaporative efficiency is concerned, while horizontal boilers occupy the middle positions. Diagrams IV. and V. give the results showing the areas of most economical performance for horizontal and vertical boilers using bituminous and anthracite coal.

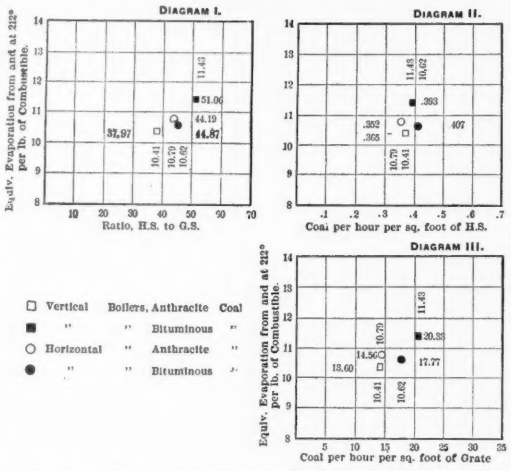


DIAGRAM I.
DIAGRAM II.
DIAGRAM III.
Equiv. Evaporation from and at 212° per lb. of Combustible.
Ratio, H.S. to G.S.
Coal per hour per sq. foot of H.S.
Coal per hour per sq. foot of Grate
Vertical Boilers, Anthracite Coal
" " Bituminous "
Horizontal " Anthracite "
" " Bituminous "

Fig. 3 —Diagrams of Average Results of Boiler Tests.

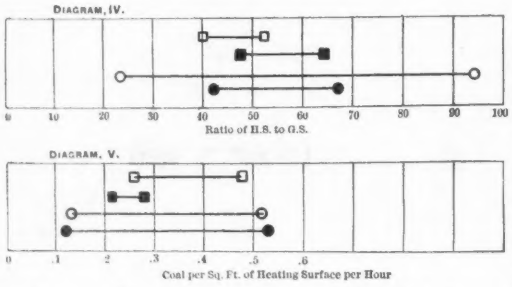


Fig. 4.—Diagrams Showing Most Economical Performance of Boiler.

In the paper, *A Staybolt Threading Device*, Mr. Hartness describes a means for threading staybolts, which consists of placing two screw dies, described above, in tandem and threading both ends of the bolt at the same time. This insures accurate correspondence in lead. Both dies should be of the opening type, but the rear die may be a non-opening one.

The Stevens Valve Gear for Marine Engines, by Mr. Andrew Fletcher, is an account of the origin and introduction of the Stevens valve gear for the beam type of marine engines, as contained in two letters of recent date from the inventor, Mr. Francis B. Stevens. The Stevens valve gear, wherein the cut-off is fixed and the speed is controlled by the steam pressure, was first used in 1840 on the steamboat Albany. The patents expired in 1862. Since the expiration of the patents the gear has been used almost exclusively on all beam-engine paddle-wheel steamboats in the United States. Of late years the substitution of the screw, with quick moving engines and slide valves, has in great part superseded the paddle wheel.

Mr. David Guelbaum read a paper on *The Law of Hydraulic Obstruction in Closed Streams*, in which he arrives at a formula which, expressed in words, says: "If an obstruction placed within a stream enclosed in a casing with an upset is changing its position from the limit distance h_0 to the distance h toward the upset, causing thereby a certain variation in the quantity of motions of the contracted stream around the obstruction, then the difference between the full pressure upon the obstruction and the direct pressure upon it due to loss of height only, equals twice the part of the variation in the quantity of motion that reacts upon the area of the obstruction, plus a certain constant; pressures and loss of height mentioned being those due to presence of obstruction only."

Mr. Arthur L. Rice described *A Wire-Testing Machine.* This consists simply of a frame made of two uprights supporting a spring balance on a top crosspiece. At the base of the frame is a pulling gear made with gear wheels and a screw, all operated by a hand wheel. The apparatus is also supplied with an air dash-pot to prevent the sudden rebound of the spring balance when the specimen breaks. The machine works satisfactorily up to its full capacity of 200 lbs. and costs about $32.

Mr. Charles T. Main presented a paper on the *Valuation of Textile Manufacturing Property*, in which he at considerable length sets forth the various conditions to consider in the valuation of manufacturing property, whether it be for the purpose of sale, bonding, insurance, condemnation, adjustment of losses by fire, etc.

Brief mention should also be made of the paper by Prof. Wm. S. Aldrich, of Morgantown, W. Va., on *Notes on Rating Electric Power Plants Upon the Heat Unit Standard*, the first paper of which was presented at the Hartford meeting and reported with discussion in our issue of June 4, page 383. The present paper goes a little into the details of the subject, and the author draws from his investigations some practical conclusions. Among other items he states that anything which tends to increase the economy of electric power plants along the lines which have been clearly marked out in the development of high duty pumping engine plants, merits considerable attention, and it is believed that the heat unit standard specifications and the subsequent contract trials of pumping plants upon the heat unit basis have combined to develop electric railroad plants in a large degree. Should there be an extensive discussion on this paper we will speak later more in detail in reference to the heat unit standard.

Mr. John B. Mayo, of Brooklyn, N. Y., submitted a paper on *A Strength of Gear Chart* which showed graphically the horse powers for cast-iron gears, cut or machine dressed, for given velocities, from formulæ by Wilfred Lewis, originally appearing in the *American Machinist.* The publication of this chart would hardly be of value to our readers, and those interested will find the subject well discussed in the paper.

Mr. George Richmond, of New York, presented a paper on *Thermodynamics Without the Calculus.* This subject should prove of considerable interest to engineers, and the paper will be published at some length in a future issue, with notes on the discussion at the meeting.

Dr. Thurston's paper on *Multiple Cylinder Steam Engines* we also hold until the call on our space shall be less, in order that we may print it nearly in full. Mr. Geo. W. Dickie's paper on *Auxiliary Engines* and *Transmission of Power on Naval Vessels* is also held over.

The Union Electric Semaphore Signal.

The Union Switch and Signal Company, of Swissvale, Pa., has lately designed a semaphore signal to be operated by an electric motor, the motor to be placed in a suitable box at the base of the post. One of these signals is in use on the Michigan Central at Detroit and we give herewith illustrations showing its general appearance and some of the details of construction. Its more prominent peculiarities are the metallic post and arm, the disposal of the rods inside the post and the placing the battery-well beneath the post. From Mr. J. P. Coleman, Assistant Engineer of the Union Company, we have the following account of the different stages in the evolution of this signal.

Until quite recently semaphore signals operated entirely by electricity have been of doubtful value because there was no suitable battery or motor; but small motors of high efficiency and primary batteries of low internal resistance, free from the wasteful effects of polarization, have been developed in the past few years, making the problem commercially possible. The best types of these batteries, however, are capable of but two or three amperes discharge without a serious fall in their electromotive force. It is, therefore, undesirable that more than this amount of current should be drawn from the cells under any condition of service, and to avoid this the motor of the signal should have such a resistance as to prevent a greater discharge through it. A motor which uses as a maximum three amperes of current will require a battery of many cells in order to develop the necessary energy to operate a signal of the usual type, counterweighted in the usual way, and the cost of installation and of maintenance becomes high in consequence. Semaphore signals, while fairly well suited to be worked manually, are far from well designed to work automatically, when gravity constitutes the only power by which they are moved to danger.

The first and most important requirement of a signal is that it shall invariably show danger when the force operating to clear it ceases to act upon it. In the Union pneumatic signals a failure in the supply of either the compressed air or of the electric current controlling it will cause the signal to move by gravity to the danger position. Signals thus operated were, until quite recently, of the same construction as those worked manually. The friction of the parts was objectionable, but notwithstanding this and other drawbacks, fully 2,000 signals of this type are in successful operation to-day. But each operation of a pneumatic signal represents about ¼ H. P. of energy, the larger part of which is required to operate the heavy counterweight, and although one compressor supplies the energy for many signals and it is found economical to thus operate them, a lighter signal is desirable.

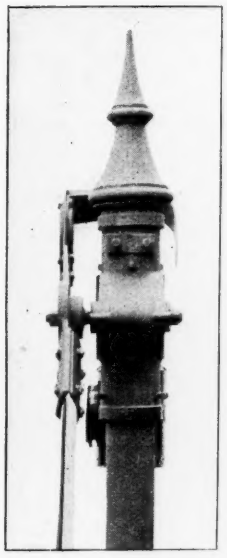
By designing a semaphore signal with connections inside the post, and by eliminating the surfaces which are liable to suffer from snow, sleet, ice and wind pressure, we were enabled to materially reduce the counterweight required to insure the signal's return to danger, and therefore to reduce the power necessary to move the signal. This change in design produced a post which is light and graceful in appearance, and left only the semaphore arm and its bearing subject to weather influences. Notwithstanding these improvements the signal was yet too cumbersome to work by electric power alone, and the problem of still further lightening it was taken up and solved.

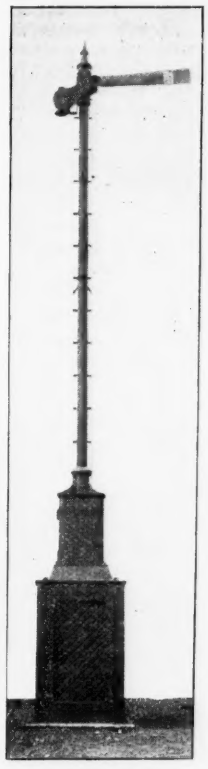
The chief obstacle to the reduction of the counterweight was the length and area of the blade, and the consequent liability of a heavy accumulation of sleet or ice upon its surface. To reduce this we designed a blade more in harmony with the slender post supporting it. A further step in this direction was to extend the spectacle casting, and to so design it as to present as much surface as possible to the weather, thereby permitting snow and sleet to accumulate upon it with the effect of balancing to some extent a like accumulation upon the blade. These modifications, coupled with the pivoting of the blade to the right of the post's center, produced a blade which, while somewhat smaller than those ordinarily used, bears a strong resemblance to them. Yet it is much less liable to be retarded in its operation by snow, ice or wind.

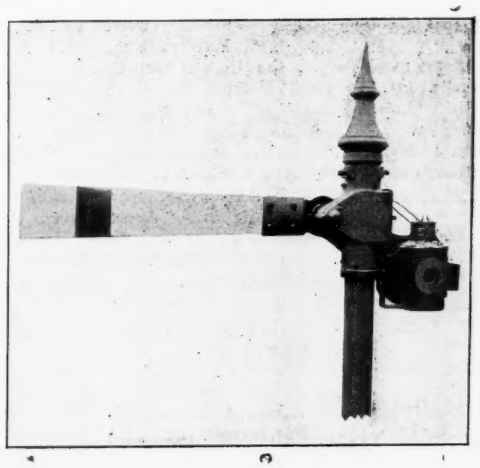
Experience with all classes of signals for about 20 years had impressed upon us the dangers resulting from the free and frequent use of paint upon them. Numerous instances of improper operations were trace-

able to this cause. An ordinary semaphore signal balanced when new to rest at danger may be and actually has been repainted enough in four years to completely overbalance its spectacle and back light, so that it would show safety when disconnected from its balance lever. Wooden blades sometimes break off in service and by heavy winds. To meet these faults we have made the blade of our new signal of aluminum, as being the lightest and most durable metal suitable to this pur pose, and we have used colored enamel, carefully applied, as a substitute for paint. When dulled by service the original brilliancy of the colors may be restored by simple washing.

Furthermore, snow and sleet are less likely to adhere to the hard smooth surface of the enamel than to that







The Union Electrically-Operated Semaphore Signal.

presented by wooden blades. The flat elliptical section was adopted so that there should be no horizontal surface presented by the upper edge of the blade.

Another step of importance was to remove the surface presented by the extension of the semaphore shaft through its bearing at the rear for supporting the back light. In the new signal the back light is carried by the semaphore spectacle on an arm projecting from it to the rear of the post; and the semaphore shaft does not project through the bearing in the rear of the post at all.

Having constructed a signal capable of reliable operation with a moderate counterweight, we obtained the conditions to operate economically a semaphore signal from a reasonable number of cells of primary battery. The next problem was to construct a mechanism which would work such a signal under all conditions. Motors operating on low electro-motive force and using small currents are necessarily of high speed, from 1,500 to 2,000 revolutions a minute. To transmit this energy to the shaft of a semaphore signal so as to turn it through 60 deg. (to move the signal from danger to safety), could be accomplished by directly connecting the shaft of the motor with that of the signal by means of one or more sets of gear wheels, as in ordinary clock work. Assuming that the average time consumed in moving the signal from danger to clear should be about six seconds, and that the speed of motors best suited to this work is 1,800 revolutions a minute, it follows that the motor will make 180 revolutions in clearing the signal. This, however, involves only one-sixth of a revolution of the signal shaft. A whole revolution would, therefore, involve 1,080 revolutions of the motor, from which fact it is evident that the semaphore shaft revolves with a power 1,080 times greater than that of the motors.

A motor of small size is therefore well suited to this purpose, and has ample power to operate a signal in the time specified and to overcome unusual resistances in its bearings, etc. But on returning to danger, the signal, if thus directly connected, must drive backward the gearing and the motor, and to do this must have a large excess of counterweight over what would be used were the gears and motor not operated by it, just as the power to overcome resistance is increased in each successive shaft when driven by the motor in clearing the signal; so is that power decreased in each successive shaft when driven backward.

Therefore, we have avoided the direct gearing of the motor to the signal Instead, the motor is geared, in a similar manner, to a main shaft in the mechanism, which is suitably equipped to give a vertical upward movement to the signal-operating rod. This rod is formed of two parts, one attached to the signal and one to the driving mechanism, and they are enaged or disengaged by means of an electro-magnet, the device forming what is commonly termed an electric slot. By this means of operation the mechanism, including the motor, is never turned backward, the signal being totally disconnected from the gearing and moving to danger entirely independently of it, while the motor and gearing never operate except to clear the signal. The signal moves instantly to danger when the current holding it at clear is interrupted. This method of operation also enables us to operate two or more blades on one post by a single motor and set of gearing; that one of the signals only being operated whose slot is energized. In the case of a home and a distant signal on one post, the home signal is first cleared, and the distant signal as soon thereafter as the conditions permit. Both may be thrown to danger together, or the distant signal independently of the home, as is customary and desirable in common practice.

The magnets of the slots are of very high resistance and hold the signal at clear with a current much less than that used in any other form of signal, while the motor, having no weight to raise other than that actually required to insure the signal's return to danger, operates from a 10-volt battery on a current of less than two amperes.

The motor upon clearing the signal becomes idle and remains upon an open circuit (the slot holding the signal at clear), until the signal is again put to danger by action of the slot magnet.

This mechanism has been found very simple and reliable in operation.

It will be evident that every step taken in the development of this signal was with a view of reducing the cost of its maintenance. Heretofore the aim has been more to produce a cheap signal than one cheaply operated. We have, as a result, a signal long desired for automatic block work that not only far excels the disk signal, but one which can be operated at an expense very much less than has ever been attained with disk signals.

We recognize that this signal, though acceptable to many as having a blade sufficient in size for the ordinary requirements of block work, will not meet with universal approval in this particular; and though we are encouraged by the favorable comments of those who have seen it, we are prepared to furnish a signal of this design provided with one or two blades of any size and style desired. In the design here shown the blade is about 8 in. shorter than that of our standard manually operated semaphore; but its bearing is at the right of the center of the post, so that for all practical purposes it is only 3 in. shorter than the older form.

While the signal is shown as mounted on a pedestal which forms a compartment over its foundation, into which the batteries are drawn up for inspection or renewals from a well formed in the masonry, it is manifestly possible to mount it otherwise if desired. But any resistance in the motor circuit, external to the motor itself, is a source of loss, and the batteries should be as close to the motor as practicable. Batteries work best in a moderate and uniform temperature, hence the desire to place them below ground. A receptacle is formed in the signal base into which the lamp of the signal may be placed by day, and where oil, track wires, drills and other repair material may be housed and all secured with the batteries by one lock.

It is manifestly possible to operate this signal either normally-clear or normally-danger, but we must adhere to our advocacy of the normally-clear plan as being the simplest in construction, the most reliable in operation, the one most readily adapted to traffic conditions and to unusual track situations, and the only one by which inspectors can see the conditions of the signals of adjacent tracks from the rear of trains. From the method by which they operate, normally-danger signals cannot be made to conform to the rule that every failure should put the signal in the danger position; and the inability to determine whether a signal's movement to clear is due to the approach of a train or to a failure of the apparatus is as undesirable as it is unavoidable.

Additions to the Niagara Falls-Buffalo Transmission Plant.

The power transmission line from the Niagara Falls power house to Buffalo is being increased, the demand for power from Buffalo having extended beyond the capacity of the wires already in use. An order for three new cables to be strung on the present poles, as well as for additional transformers, has been placed with the General Electric Company. The cable will be insulated to stand the ultimate pressure of the line, of 22,000 volts, and is tested under a considerably higher pressure before leaving the works. Twenty-four thousand feet of this cable will be used at first for that part of the transmission line within the city of Buffalo. The order for increasing transformers covers seven of similar size and design to the three already installed in the transformer house of the Niagara Falls Power Co. Each of these 10 transformers has a capacity of 1,250 H. P., making a total step-up transformer capacity of 10,000 H. P. They are of the air-blast type, and will stand in rows of four upon the air-tight chamber, whence the air is forced through the ventilating spaces in the transformers. It will be remembered that the two-phase current at 2,200 volts passes from the 5,000 H. P. generators in the power house to the transformers. In these it is not only increased in pressure but changed in phase, the current issuing from the transformers three-phase current at 11,000 volts. This pressure will be adopted until it becomes necessary to increase it, when it will be doubled and be delivered to the transmission lines at 22,000 volts. On its arrival in Buffalo it will be delivered to the step-down transformers of the Cataract Power Conduit Co., which controls its distribution there. The electricity will be transformed down to different pressures for distribution over a city network to different points for a variety of purposes, being used directly in induction motors.

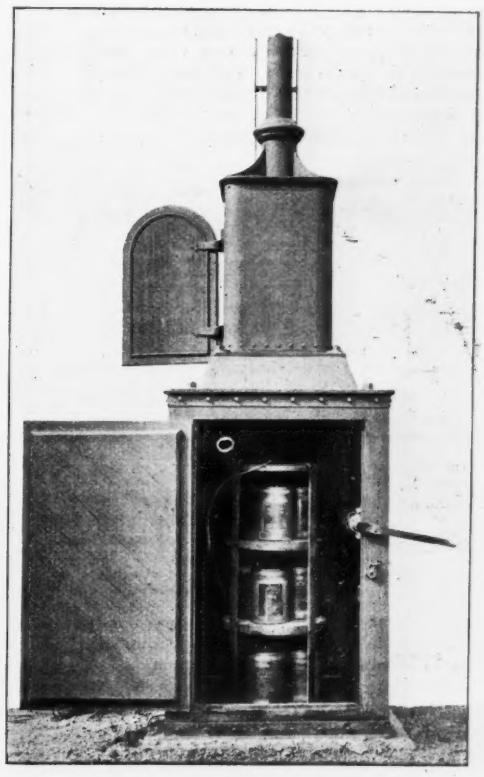
Several step-down transformers will also be placed in the station of the Buffalo General Electric Co., and from these, three-phase current, converted into direct current in rotary converters, will be utilized for lighting purposes and for small power.

The Buffalo Railway Co. is also increasing its step-down transformer and rotary converter capacity in its Niagara street power house. In addition to the two 500 H. P. converters already in operation, two others of similar capacity and construction are to be installed. These will bring the total converter capacity in the station up to 2,000 H. P. To supply these necessitates the installation of three additional step down transformers, and in the transformer house between the station and the canal. These will be of about the same capacity as the three already there—each of 275 KW., reducing three-phase current from about 10,500 volts to 375 volts for delivery to the alternating current side of the rotary converters, in order that it may issue direct current at 550 volts, at which pressure it is delivered to the bus bars of the station switchboard.

Foreign Railroad Notes.

Aug. 24 last contracts were let for 400 new locomotives for the Prussian State Railroads. The contracts were awarded to eight different works, three of which have enough to keep them busy till the end of next year. The average cost appears to be about $12,000 per engine.

A "north and south" express train is to run this com-



Union Electric Semaphore—Base of Post.

ing season between Berlin and Naples, passing by Leipsic, Munich and Inspruck. It will have only first-class cars and the fare will be more than the ordinary first-class fare.

The Hungarian government contemplates giving out contracts for 370 locomotives, 1,130 passenger and conductors' cars and 7,000 freight cars, to be delivered at intervals within the next five years.

Reed Recording Scales.

The illustrations represent the Reed recording attachment, a simple device which can be attached to any railroad scales now in use to regiser the weight. With this arrangement there is no chance for mistake in taking the weight from the beam, since the attachment does it. Fig. 1 shows a railroad scale beam, with the

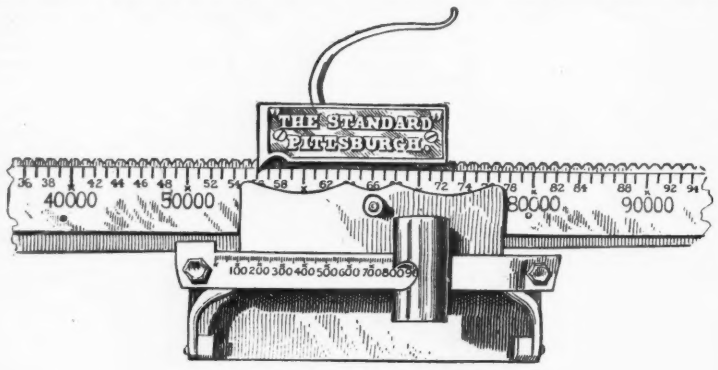


Fig. 1.—The Reed Recording Attachment.

attachment in place. Placed in the beam at intervals on an incline corresponding to lines upon a card are six puncturing pins. The large poise is provided with a card holder, the only extra movable part over that of an ordinary beam, while the small poise has a brass casting and a puncturing pin, which extends back of the card

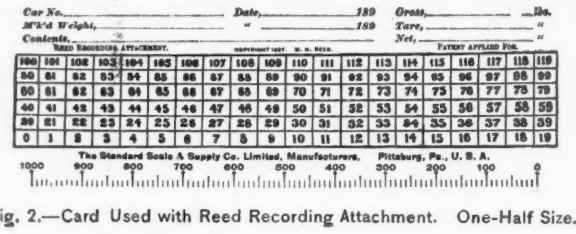
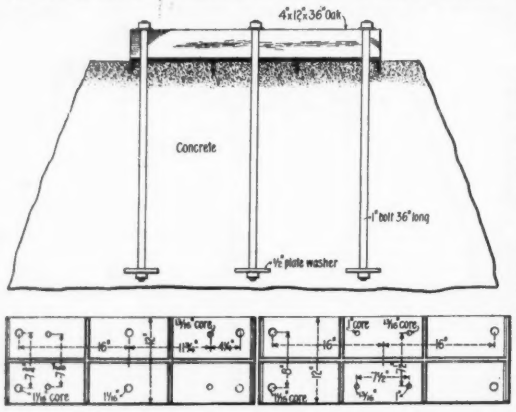

Car No. Date, 189 Gross, lbs.
M'k'd Weight, " 189 Tare, "
Contents, Net, "
REED RECORDING ATTACHMENT. PATENT APPLIED FOR.
The Standard Scale & Supply Co. Limited, Manufacturers, Pittsburg, Pa., U. S. A.

Fig. 2.—Card Used with Reed Recording Attachment. One-Half Size.

holder. When weighing a load a card, graduated as shown in Fig. 2, is placed in the card holder. After the beam is balanced the holder is pressed toward the beam and the recording pins puncture the card. Thus one movement records the total weight of the load, and that in less time than by reading from the beam. At the same time a record is obtained which can be referred to at any time. This attachment is made by the Standard Scale & Supply Co., of Pittsburgh, Pa., and is now in use at a number of steel and iron works.

Concrete Signal Foundation with Iron Top.

On the Chicago & Alton Railroad, foundations for signal connections are now being made of concrete, with a cast iron top, and the engraving shows a section of such a foundation, together with plan views giving the dimensions of the iron plate. The manner of placing the plate and of fastening it to the foundation will be readily understood by reference to the drawing. Both the plate and the plank fixed to the top of it may be readily



Concrete Foundation for Signal Connections.

removed in case of need. Mr. Slattery, Foreman of Interlocking, introduced this style of foundation several months ago and thus far he is much pleased with it. The iron plate is $\frac{7}{16}$ in. thick and the ribs which penetrate the concrete are $1\frac{1}{8}$ in. long and $\frac{1}{2}$ in. thick at the thickest part. The right hand diagram shows a plate with holes suitable for supporting a crank stand, and the left-hand shows one designed for a compensator.

For the drawings we are indebted to Mr. Riley, General Roadmaster at Bloomington.

TECHNICAL.

Manufacturing and Business.

The Gulf & Brazos Valley Railroad, W. A. Squires President, Henrietta, Tex., is in the market for 40 miles of relaying rails, not less than 56 lbs. to the yard, with fastenings and bolts.

George H. Webb, Room 6, Pennsylvania Station, Cincinnati, O., is in the market for two spans of second-hand steel or iron railroad bridge, in good condition, 200 ft. center to center of end pins and not to exceed 17 ft. center to center of trusses. They must be capable of carrying two 66-ton engines with a train weighing 2,500 lbs. per lineal foot of bridge.

The Davis & Egan Machine Tool Co., Cincinnati, reports a continued improvement in both home and European trade, with a good demand from England for American tools. The new addition to the plant is running full and the company is working 12½ hours a day, and in several departments all night.

Mr. Sonnenberg, of S. Solomon & Co., of Port Elizabeth, South Africa, will be in New York shortly. We understand that his object in visiting this country is to place some orders for electrical machinery.

Willis Shaw, contractors' machinery, Chicago, Ill., reports the following recent sales: 75 H. P. double-drum mining hoist to J. D. Hardin, Deadwood, S. Dak.; quarry machinery to the Mitchell Lime Co., of Mitchell, Ind.; 80 H. P. air compressor to the "Soo" Line, Minneapolis; hoisting machinery to the Big Four Railroad at Ludlow Falls, O; steam tug to James Stewart & Co., of St. Louis; two locomotives and an equipment of Shaw dump cars to Vandegrift & Jacobs, for use on the Duluth & Iron Range Railroad; 75 H. P. mining hoist for the Great Eastern Gold Mining Co., of Deadwood; 50-ton steam shovel to the Marion Brick Works, at Marion, Ind., and a carload of hoisting engines to Major Harrod, of the New Orleans Drainage Commission.

The Pyle National Electric Headlight Co., Monadnock Block, Chicago, reports an increasing business during the last few months. This company has recently received orders for 30 electric headlights for the Kansas City, Ft. Scott & Memphis Railroad, and a shipment of seven headlights has just been made to the St. Louis Southwestern, which is equipping its passenger engines with electric headlights. Pyle-National electric headlights have been specified for four engines ordered from the Baldwin Locomotive Works by the Texas & Pacific. We understand that the Cincinnati, New Orleans & Texas Pacific has adopted the electric headlight as its standard.

The Missouri Car & Foundry Co., of St. Louis Mo., has acquired the plant of the Madison Car Co., at Madison, Ill., which will hereafter be operated as part of the Missouri Car & Foundry Co. Some departments will be started at once, and all departments as soon as necessary orders are received. This will give employment to a large number of men.

De Fries & Co., of Berlin and Dusseldorf, Germany, have established a branch store at Vienna, Austria. They will sell machine tools made by the Davis & Egan Machine Tool Co., of Cincinnati, O. The branch store will be in charge of F. H. Reime.

The Chicago & Northwestern has given orders for its new bridge at Winona, Minn., over the Mississippi River, to the Detroit Bridge & Iron Works for the superstructure, and the Vulcan Iron Works, of Chicago, for the operating machinery and the turntable. The Vulcan Iron Works advise us that this will make the eighth drawbridge across the Mississippi River for which they have furnished machinery.

Fitz-Hugh & Co., Monadnock Building, Chicago, Ill., are offering for sale the standard gage (simple and compound) locomotives used as motive power on the Lake street elevated road of that city before it was changed to electricity. The engines weigh from 56,000 to 60,000 lbs. and are equipped with Eames vacuum brakes.

New Stations and Shops.

The Chicago, Indianapolis & Louisville expects to build a six-stall engine-house at Bedford, Ind. The contract has not yet been let.

The Florence & Cripple Creek Railroad has begun building a new station at Victor, Colo. The structure will be triangular in shape, 70 ft. long by 70 ft. in width at the widest point, with a tower 60 ft. high, surmounted by a copper dome, on which will be a bronze figure of Mercury. The material to be used in the building will be white stone, relieved by trimmings of a darker hue. The ground floor will be used for waiting rooms, ticket-offices and baggage and express rooms, and the second floor for the offices of the company. The architect is H. T. E. Wendell, of Denver.

Part of the car shops of the West Shore Railroad at Weehawken, N. J., was destroyed by fire Nov. 28. The loss is estimated as $10,000.

Work on the new shops of the Peoria & Eastern at Urbana, Ill., is progressing rapidly, the foundations for the shops being in, and the new roundhouse practically under roof. All of this work is being substantially done, and the total cost will be, it is estimated, about $300,000. An electric turntable is one of the improvements, and it is expected that the cost of turning engines in the new way will be about one cent for each turn. Plans and a description of these shops were published in the *Railroad Gazette* Sept. 24.

Armor Plant Plans.

According to the plans to be submitted by the Naval Board to the next Congress, a plant has been designed to cost $3,747,912 and have a capacity of 6,000 tons of armor a year.

Launching of the Australia.

On Nov. 27, the large lake carrier Australia was launched from the yards of the Chicago Shipbuilding Co., South Chicago, the barge being almost a duplicate of the Amazon recently completed at the same works. The Australia is a towing schooner and will carry no sails. The dimensions are: Length over all, 388 ft.; keel, 376 ft.; beam, 48 ft.; depth, 26 ft. The barge is fitted with an electric light plant, steam pump, steam winches, steering gear and heated by steam. The carrying capacity is 6,500 tons, and the owner is James Corrigan, of Cleveland.

Bridge Materials for Japan.

The Pencoyd Iron Works (A. & P. Roberts Co.), Philadelphia, Pa., have received a contract to furnish 3,800 tons of bridge materials for the Imperial Government Railways of Japan.

Electric Lighting of Cars on the New York Central.

The twenty-one new cars recently built by the Wagner Palace Car Co., for the New York and Chicago limited trains over the New York Central and the Lake Share are now in service, on the 24 hour trains which leave New York at 5 p. m. and Chicago at 5:30 p. m. These trains have electric lights throughout. The current is furnished by a dynamo carried in the baggage compartment of the buffet car, and Gibbs' coupling, wiring and berth lamps are used. These trains now have an observation car at the rear, and have all the fashionable accessories; a ladies' maid, a stenographer and typewriter and a barber. The cars have wide vestibules. In most of them the interior decoration is of Colonial design, and the woodwork is of English oak, satin wood, white mahogany, Circassian walnut and other rare kinds. The dining cars are divided into compartments, separated by partitions and portieres, so that parties of two or four persons can have practically a room to themselves. Some of the sleeping cars also have sections separated by partitions, so as to give "nearly the same exclusiveness as in the case of a state room." There are libraries both in the drawing-room car and the smoking-car. The barber-shop, bath-room and baggage compartment are grouped together in the forward car. In the compartment sleeping-cars the different rooms are finished in different kinds of wood and in these and all the cars the draperies and upholstery harmonize in color with the woodwork

THE SCRAP HEAP.

Notes.

The Chicago & West Michigan now uses gates on all passenger cars and requires passengers to show their tickets on entering.

The Lake Shore & Michigan Southern has placed the management of its dining-car service in the hands of the Wagner Palace Car Co.

A press dsepatch from San Francisco says that the California State Board of Health will require sleeping cars coming into the state to be disinfected with formaldehyde every trip.

The Missouri Pacific has restored the pay of the employees in the general offices at St. Louis to the basis in force previous to the reduction made in 1893, which reduction was about 10 per cent.

At Algiers, La., on the afternoon of Nov. 19, a large block of earth slumped into the Mississippi River, undermining the station of the New Orleans, Fort Jackson & Grand Island Railroad. The damage was about $15,000 A number of passenger cars were saved only by their very prompt removal to a place farther from the river.

Dock No. 4 of the Chicago & Northwestern Railway at Escanaba, Mich., was destroyed by fire on the night of Nov. 29. There was a large quantity of lumber on the dock, which was burned up, together with 31 ore cars, and the total loss to the company is estimated at $150,000. The fire started in the hold of the steamer Nahant, which was damaged to the extent of $40,000. A deck hand and a fireman were burned to death trying to save the vessel.

Press despatches from Seattle Nov. 26 report that the track of the Everett & Monte Cristo has been very badly damaged for more than 30 miles by the flood in the Stillaquamish Canyon. The water was higher than was ever before known. For distances of miles the water was so deep that there was a powerful current many feet higher than the track, and the rails and sleepers were all washed off the roadbed. The flood poured through tunnels and completely cleared them of ballast; and, according to the veracious observers, of rails and sleepers also.

Judge Sanborn in the United States Court at St. Paul has heard in Chambers the petition of the employees of the Union Pacific for an order giving them representation on the Board of Trustees of the hospital department and has confirmed the report of the Master in Chancery denying the prayer of the petitioners. It appears that the question was not gone into on its merits, the judge deciding that it would have to be reconsidered at

a future date on account of the change of ownership of the railroad. The report in the newspapers, that the court had ordered the hospital fund discontinued and the money redistributed to the employees who had contributed, seems to be unfounded

Steamship Line to India.

The steamer Sahara, which will sail from New York Dec. 5 for Aden, Bombay, Calcutta and other ports, will open up a new regular line between America and India. Heretofore only transient steamers have directly connected the two countries. The Sahara will carry as part of her cargo a shipment of rails rolled for India by the Maryland Steel Co.

Steel Barge Line.

The meeting of the joint committees appointed by the Merchants' Exchange and the Business Men's League, of St. Louis, was held in that city Nov. 26 for the purpose of formulating plans for establishing a line of steel barges between St. Louis and the Gulf. The sub-committee, consisting of Messrs. Henry Langenburg, S. M. Kennard, Murray Carleton, J. H. Lichberger and Henry S. Potter, was appointed to draw up detailed plans for the organization of a company and the operation of the barge line.

A Submarine Boat.

On Nov. 20 a trial of the Lake Submarine boat Argonaut was made in the Patapsco River, at Baltimore. The trial lasted about two hours, during which the boat ran about four miles, and was submerged and allowed to rise a number of times. The boat is built of steel, and is mounted on wheels, to the front pair of which a motor is connected so that it may move on the bottom. It is divided into four compartments, and will carry a crew of six men.

A New Southampton Record.

The North German Lloyd steamship Kaiser Wilhelm der Grosse, when she arrived out on Nov. 29, completed the fastest trip made from this port to Southampton, her time from the Sandy Hook Lightship to the Needles being 5 days 17 hours and 8 minutes, an average of 22.35 knots an hour. This is better by 17 hours and 6 minutes than the best previous eastward record, that of the American liner St. Louis, made in September last. The daily runs were 401, 520, 513, 528, 525, 507 and 71 knots.

The Nicaragua Canal.

It is now stated that the Nicaragua Canal Commission will sail from New York next Sunday on the gunboat Newport. The departure of the party has been delayed by the resignation of Mr. Shunk, who was selected as Chief Engineer. Mr. E. S. Wheeler, of Sault Ste. Marie, Mich., has been appointed to that position. Mr. Wheeler was for many years on the Survey of the Great Lakes and has had much experience in hydrographic, geodetic and topographic work. A party of about 60 engineers, draughtsmen and assistants will sail on the Newport.

The Walker Manufacturing Company.

It is quite obvious that the Westinghouse Electric Co., the General Electric Co., and Mr. Sprague's new company are not to have all the work that is bound to come from the great expansion of the uses of electricity. Last week we announced the rumor of the sale of the Walker Company; this is now confirmed. The capital stock and the bonds of the company, amounting to $2,500,000 of stock and $1,500,000 of bonds, have been bought by Messrs. Roswell P. Flower, J. W. Hinckley, Anthony W. Brady and Perry Belmont, all of New York. One of the principal owners was Mr. Perkins, of Cleveland; he has sold out. Mr. S. H. Short, Vice-President and Chief Engineer, has also sold out his stock, but he remains in the service of the company.

The Report of the Secretary of the Navy.

The report of the Secretary of the Navy is doubtless a considerable disappointment to those who wish to see shipbuilding go on regardless of the state of the Treasury. The Secretary recommends one battleship for the Pacific Coast and a few torpedo boats and torpedo boat destroyers. He recommends further, however, a great increase in docking facilities and that the following works be begun at once, the cost of which, he says, will be less than that of one additional first-class battleship: One dock, at Boston, for the largest ocean going vessels; one at Portsmouth, N. H., suitable for the use of the Navy Yard there; repairs and enlargements to Dock No. 2 at New York, to accommodate the largest battleship; widening of the timber dock at League Island; lengthening of the dock at Norfolk to take in anything except the largest ships; at Algiers, N. C., a steel floating dock, and at Mare Island a first-class dock as soon as the depth of water—now 20 ft.—is increased to the draft of large ships. He recommends further the purchase of a suitable tract of land near New York whereon to establish a naval magazine, and he recommends also that the post-graduate sea service of cadets be reduced to one year instead of two, as at present. This would add immediately 37 officers to the list, and the number of officers is to-day inadequate. An increase in enlisted men is also urged.

Laying Deep-Water Cable.

On Nov. 26 a number of men interested in telegraphy and ocean cables boarded the Mackay-Bennett to witness the laying of an ocean cable to connect the Coney Island cable with Sandy Hook. The entire process was watched with considerable interest and the splicing of the cable was probably the most interesting part of the process, although this part of the operation could not be watched by the visitors inasmuch as precautions were necessary to exclude all moisture while uniting the stranded ends of the two cables. After this part of the work had been completed and the spliced parts thoroughly insulated, the cable was run out from the bow much to the surprise of many who shared in the common belief that the cables were run out from the stern. It required but 55 minutes to lay five miles of wire.

British Locomotive Exports.

The October exports of locomotives from Great Britain showed a marked contraction. The value was about £51,000 as compared with £94,000 in October, 1896, and £105,000 in October, 1895. The total value of engines exported for the first 10 months of this year was £907,000, somewhat more than in the same period of 1896, and £187,000 more than in the first 10 months of 1895. The largest deliveries were to British India and the next to Australasia, and then followed South America and British South Africa in the order named.

Kentucky and Tennessee Railroad Taxes.

The State Railroad Commissioners of Kentucky have completed their assessment of railroad property for taxation. The total valuation amounts to $43,550,876, which is about five millions less than last year. The decrease, however, is accounted for by the omission of certain bridges across the Ohio River which are not used wholly for railroad purposes, and the aggregate valuation of the railroads is actually about $250,000 more than last year. In Tennessee the State Railroad Commissioners have reported a valuation, and it has been approved by the State Board of Equalization, which is said to be 75 per cent. greater than the last preceding valuation. It will be remembered that the State Commission of Tennessee is a new Board. The assessment was formerly made by another body. The principal railroads of Tennessee have secured from the United tates Circuit Court a temporary injunction restraining he Board of Equalization from certifying the assessment.

Brown's Discipline on the Rock Island.

On the Chicago, Rock Island & Pacific, from Oct. 1, 1896, to Oct. 1, 1897, the first full year of discipline without suspension, the number of men receiving demerit marks was about the same as the number suspended in the last preceding year. From the *Topeka Journal* we learn that during the year reported the number of men employed (in the departments where this plan is applied—enginemen, firemen, trainmen, yardmen and telegraph operators) was 16.43 per cent. larger than the preceding year, and that the number disciplined increased 17.53, per cent., making the actual increase in the number disciplined about one per cent. It is said that the employees as a whole now look upon the new plan with favor and that this percentage record confirms them in their favorable opinions. Of the total number of men employed in the departments named, 78.25 per cent. received no demerit marks whatever during the year; and, under the regulations, each man with this clear record receives 20 merit marks. The Rock Island invites suggestions from all employees, concerning the conduct of their work, and a considerable number of employees have received merit marks during the year for accepted suggestions.

Disastrous Collisions in Europe.

A press dispatch of Nov. 24 reports the killing of 10 persons, and the injury of a large number, by a collision of railroad trains during a dense fog, at Tarbes, in Southern France.

At Warsaw, Russian Poland, on Nov. 30, a freight train ran into the rear of a passenger train standing at the station, killing 11 persons and injuring 22 others.

Fast Run on the Union Pacific.

Press dispatches from Omaha Nov. 29 report that the fast mail train of the Union Pacific, having been detained by a fire at Medicine Bow, had run from Cheyenne to Council Bluffs, 519 miles, in 559 minutes, equal to 55.7 miles an hour. All the regular stops were made and there were delays due to the bursting of a hose and to the presence of a freight train on the main track at Omaha. The average running time, excluding stops, is said to have been 62.5 miles an hour. From Grand Island to Ames, 100 miles, the running time, exclusive of stops, was 88 minutes, equal to 68 miles an hour.

Smothered in the St. Clair Tunnel.

A press dispatch of Nov. 29 says that three men were killed by gases in the St. Clair tunnel the preceding night. They were the runner of a tunnel engine, a conductor and a brakeman. A train broke in two and the engine backed down to pick up the portion left in the tunnel. A long time passed and a searching party was sent in and found the three men dead and saved the fireman and another brakeman, who were unconscious. Three men of the searching party were also overcome by gas, but were rescued

LOCOMOTIVE BUILDING.

The Evansville & Richmond has placed an order with the Baldwin Locomotive Works for three eight-wheel passenger engines.

The Coast Railway Co. of Nova Scotia, Ltd., will ask bids early in January or February on one locomotive for June, 1898, delivery.

The Louisville, Henderson & St. Louis Railroad has placed an order with the Pittsburgh Locomotive Works for two locomotives.

The Long Island Railroad will send out specifications within one week for five American-type locomotives, to have 18 × 24-in. cylinders.

The Union Stock Yard & Transit Co., of Chicago, has placed an order with the Schenectady Locomotive Works for two switching locomotives.

The Iowa Central has placed an order with the Baldwin Locomotive Works for the two six-wheel switching locomotives referred to in our issue of Nov. 19.

The Cleveland, Cincinnati, Chicago & St. Louis has placed an order with the Brooks Locomotive Works, of Dunkirk, N. Y., for six switching locomotives.

The Atchison, Topeka & Santa Fe has placed an order with the Dickson Locomotive Works, of Scranton, Pa., for five consolidation locomotives. They will have 21 × 28 in. cylinders and 57-in. drivers.

We understand that the Chicago, Burlington & Quincy, which asked for proposals on 25 locomotives several weeks ago and subsequently ordered six Class H moguls built at its own shops, three at Aurora and three at Burlington, has again taken up the consideration of placing orders for the 25, provided satisfactory prices can be obtained.

In our issue of Nov. 19 we referred to newspaper dispatches from St. Petersburg to the effect that the Russian government would place orders abroad for 400 locomotives. We now learn that an engineer, representing the Russian government, will probably reach the United States within three weeks with specifications for the new locomotives.

In our last issue we referred to an order for four mogul locomotives placed by the Pittsburgh, Bessemer & Lake Erie Railroad with the Baldwin Locomotive Works. This same road has placed orders for four more locomotives with the Pittsburgh Locomotive Works, of Pittsburgh, Pa., and for two with the Brooks Locomotive Works, of Dunkirk, N. Y.

The Baldwin Locomotive Works have sold to the Intercolonial Railway of Canada the locomotive exhibited at the World's Fair, at the head of the Pullman's Palace Car Co.'s train, as the Columbus, and subsequently exhibited at Atlanta, and there named Atlanta. The engine is a 10-wheel Vauclain compound with 24 and 14 × 24-in. cylinders and 72-in. drivers; total wheel base 27 ft.; driving wheel base, 15 ft. 4 in.; weight, total, about 131,000 lbs.; weight on drivers, about 93,000 lbs.; boiler, 60 in. in diam., with 236 tubes, 2 in. in diam. and 13 ft. 6 in. long; firebox, length, 78⅛ in.; width, 34⅝ in., and tank capacity, 3,600 gals.

In our issue of Nov. 12 we referred to an order given by the Grand Trunk for 18 locomotives, four moguls and four 10-wheelers to the Schenectady Locomotive Works, and six moguls and four 10-wheelers to the Baldwin Locomotive Works. These are for delivery in January, 1898, and will have 20 × 26-in. cylinders. The passenger engines will weigh, in working order, 156,000 lbs. and have 68 in. (outside diam.) driving wheels and 33 in. truck wheels. The moguls will weigh, in working order, 148,000 lbs. and have 62 in. (outside diam.) driving wheels and 37-in. truck wheels. Both types will have extended wagon-top boilers, with outside diameter at smallest ring 62 in.; boiler covering of wood covered with asbestos paper; firebox, toboggan, top of frame, length 120 in., width 43 in., depth 26 in.; 300 tubes, 2 in. in diam. The heating surface of the passenger locomotives will be: Tubes, 2,225.25 sq. ft.; firebox, 184.25 sq. ft.; total, 2,409.50 sq. ft., with a grate surface of 33.43 sq. ft. The heating surface of the moguls will be: Tubes, 1,742.25 sq. ft.; firebox, 184.25 sq. ft.; total, 1,926.50 sq. ft., with 33.43 sq. ft. of grate surface. The driving wheel centers will be of cast steel, leaders and trailers cast iron. Tires will be of American type and the engine truck wheels will have cast-iron centers, steel-tired, Mansell retainers, of American make. The tenders will have eight 33-in. wheels; tender frame, 10-in. channel iron; tank capacity, 4 500 gals. The locomotives will burn bituminous coal and have a working pressure of 200 lbs. and be equipped with bronze bearings, Westinghouse air-brakes, metallic brakebeams and Westinghouse train signals. The slide valves will be Grand Trunk standard.

The Rogers Locomotive Co., of Paterson, N. J., has just received an order to build 11 eight-wheel passenger and four mogul locomotives for the Sanyo Railroad of Japan. These will be 3 ft. 6 in. gage, and the former will have 15 × 22 in. cylinders, and a total weight of 75,000 lbs. with 50,000 lbs. on the drivers; drivers 60 in. (outside diam.) with cast steel centers; truck wheels, 28 in. diam., steel tired, cast steel centers; journals, driving axle, 7 × 9 in., truck axle, 5 × 9 in.; boiler, radial stay, extended wagon top, 48 in. in diam. outside at first course; tubes, 170, brass, 1¾ in. outside diam.; firebox, 70 in. long, 27 in. wide, with 56 in. depth of front and 48 in. depth of back. The firebox will be copper, with copper staybolts, 1 in. in diam. and cast iron rocking grate and drop plate; heating surface, firebox 80.2 sq. ft., tubes 856 sq. ft., total 936.2 sq. ft.; grate area, 13.2 sq. ft. The engines will burn bituminous coal and have a working steam pressure of 170 lbs. The tender will have a tank capacity of 2,300 gals.; coal capacity, 3½ tons; frame, channel steel and steel plates; trucks, four wheels under back end, single pair front, steel tired, 33 in. diam., cast-iron centers, with 4¼ × 8 in. journals. The freight engines will have 16 × 22 in. cylinders, with a total weight of 89,000 lbs., with 75,000 lbs. on the drivers; driving wheels, 54 in. diam.; truck wheels, 29½ in. in diam., with cast steel centers and steel tires; journals, driving axle, 7 × 9 in., truck axle, 5 × 9 in.; boiler, straight, radial stays, 56 in. in diam. outside at first course; tubes, 200, brass, 1¾ in. outside diameter; firebox, length 82½ in., width 27 in., depth, front, 57 in., back 47 in. The firebox will be copper, with copper staybolts 1 in. in diam., and have a rocking grate, finger pattern, and drop-plate. Heating surface, firebox, 84.7 sq. ft.; tubes, 1,008 sq. ft.; total, 1,092.7 sq. ft. Grate area, 15.4 sq. ft. The tender will have a tank capacity of 2,300 gals.; coal capacity, 3½ tons; frame, channel steel; trucks, four wheels under back end with single pair in front, 33 in. in diam., steel tired, cast-iron centers, and journals 4¼ × 8 in. Both types have steel cabs, American type, with buffers and couplers of the English type. The brakes will be English automatic vacuum on the driving and tender wheels, in addition to hand brakes. The finish of the locomotives will be plain and somewhat on the English style, with neither bell nor pilot, and buffers with right and left screw couplers and hooks on front of the engine and back of the tender.

CAR BUILDING.

The Indiana Tank Line is in the market for 10 tank cars

The Chicago, Milwaukee & St. Paul is taking bids on 1,500 box cars, for delivery next summer.

The Indianapolis Car & Foundry Co. is building 100 freight cars for the Alton Terminal Railroad.

The Barney & Smith Car Co., of Dayton, O., is building 37 cars for the Dayton & Union Railroad.

The Long Island Railroad sent out specifications Dec. 1 for the 20 combination cars referred to in our issue of Nov. 19.

The White Oaks Railroad, of Texas, has placed an order with the Missouri Car & Foundry Co. for four water cars.

The Russell Wheel & Foundry Co., of Detroit, Mich., is building five cars for the Chippewa River & Menominee Railroad.

The Lake Shore & Michigan Southern will build three combination mail cars, two of which are already under way at the Adrian shops.

The Pittsburgh & Lake Erie is preparing specifications for 1,000 coal cars, although contracts will probably not be let for some weeks yet.

The Union Pacific, Denver & Gulf has placed an order with the Wells & French Co. for 50 refrigerator cars and with the St. Charles Car Co. for 250 box cars.

The New York, New Haven & Hartford has placed orders for 100 cars each with the Wason Mfg. Co., Osgood, Bradley & Sons and the Keith Mfg. Co.

The Lake Shore & Michigan Southern will probably order 500 box cars in the near future, although the general impression is that no orders will be placed this year.

The New York, Ontario & Western will build about 100 freight cars at its shops this winter. About this number is built each year, when the work of repairing is slack.

The Coast Railway Co., of Nova Scotia, Ltd., will need for June, 1898, delivery three passenger, one combination (baggage and smoker), two combination (baggage, mail and express), two excursion passenger, 10 box and five stock cars. Bids will probably be asked early in January or February.

Chas. M. Hays, General Manager of the Grand Trunk, denies the report that the road will shortly order additional equipment from outside builders. The road is now building 500 box cars similar to those bought from the Michigan-Peninsular Car Co. which were finished Nov. 27.

Some of the technical papers last week reported that the Chicago, Burlington & Quincy had placed an additional order for 1,000 cars with the Wells & French Co. We are informed by officials of the road that this report is incorrect and that only one order has been placed, which was noted in this column Oct. 1.

The Cincinnati, Hamilton & Dayton has placed an order with the Barney & Smith Car Co. for one 60-ft. vestibuled mail car, one 50-ft. vestibuled combination mail and baggage car and one 60-ft. baggage car, not vestibuled. These cars will be delivered about Dec. 25. The road has not ordered passenger coaches, as recently reported by one of the railroad papers.

In our issue of Nov. 12 we referred to 12 passenger cars being built by the Canadian Pacific at its shops, and the following week stated that the road was considering building 50 new passenger cars early next year. We are now advised that the road is building 20 first-class passenger cars and may also build some sleeping cars at its Montreal shops, and contemplates building a number of box cars at its Perth shops the coming winter. No contracts for rolling stock will be let outside at present.

The Chicago Great Western has placed an order with the Pullman's Palace Car Co. for 300 box cars, in addition to the order transferred to Pullman's Palace Car Co. from Haskell & Barker and noted in this column Nov 19. They will be equipped with Barber trucks, with steel bolsters, I-beam body bolster, Tracy Lyon design, Chicago and Tower couplers, Westinghouse brakes, Kewaunee brakebeams, Chicago roofs, Moore doors, McCord journal boxes, and all castings of malleable iron. The cars will be 36 ft long, 60,000 lbs. capacity, and delivered in January and February.

The Kansas City, Memphis & Birmingham has placed an order with the Pullman's Palace Car Co. for 200 box cars, to be delivered about Feb 1. These cars are to be 36 ft. long, 8 ft. 4¼ in. wide, and 7 ft. high inside. They will be equipped with the American Steel Foundry Co.'s body and truck bolsters with end castings; malleable oil boxes with McCord lids; iron axles; Western Railway Equipment Co.'s combination follower and drawhead lug; Westinghouse air-brakes; Gould couplers; A. French Spring Co.'s draft springs; Chas. Scott Co.'s bolster springs; Dunham side and end doors; McGuire grain doors; American continuous draft rods; Monteer's patent end truss, and Chicago roofs.

The St. Louis & Suburban electric railroad has placed an order with the St. Louis Car Co., St. Louis, Mo., for 30 new passenger cars.

The Metropolitan West Side elevated railroad, Chicago, has decided to equip all its motor cars with new trucks and motors of a larger capacity, and an order has been placed with the Baldwin Locomotive Works for 56 of the former, to be built from designs of the road.

BRIDGE BUILDING.

Bloomfield, N. J.—Plans for a new iron bridge over the New York & Greenwood Lake Division of the Erie at Williamson avenue have been submitted by the railroad company.

Buckingham, Va.—Bids are asked until Dec. 6 by Jno. R. Moss, Judge of Buckingham County, for a steel highway bridge 52 ft. long, 12 ft wide in the clear, and with a capacity of 1,000 lbs. per linear foot.

Cleveland, O.—Plans for a new bridge at Columbus street are under consideration by the city officials and the Chief Engineer of the Cleveland, Cincinnati, Chicago & St. Louis.

Detroit, Mich.—It is said that the Detroit & Lima Northern has asked for permission to build a bridge over the Rouge River, in Spring Wells township.

Gore Bay, Ont.—The Indian Point bridge is to be built at once, the Indian department having decided to grant $3,000 for the purpose.

Harrisburg, Pa.—Bids are asked until Dec. 14, for rebuilding the substructure of the bridge over the Little Juniata River, at Birmingham, and at the same time bids will also be received for the superstructure of the same bridge. Plans and specifications can be had on application to Amos H. Mylin, Auditor-General.

Hico, Tex.—The Texas Central has contracted with the Edge Moor Bridge Works for a 140 ft. skew bridge, to be built on the middle crossing of the Bosque River.

New York.—On Nov. 22 the Board of Estimate and Apportionment appropriated $145,000 for the Ninety-sixth street viaduct on Riverside Drive.

Commissioner of Public Works C. H. T. Collis has ordered plans made by Dec. 5 for a viaduct to be built from Claremont to 135th street to connect Riverside Drive with the Boulevard.

On Nov. 29 the Board of Estimate appropriated $1,246,000 for a new drawbridge across the Harlem River from 146th street to 149th street. The plans for the structure were approved recently by the Secretary of War and the Park Board.

Omaha, Neb.—Plans for two bridges over the lagoon are under consideration by the Park Board. Andrew Rosewater, Chairman Board of Public Works.

Syracuse, N. Y.—The plans for the lift bridge which is to replace the swing bridge over the Erie Canal at Salina street have been approved. The bridge will have a 40-ft. roadway, and is estimated to cost $36,000.

Tilsonburg, Ont.—Canadian bridge companies are asked to tender on a steel bridge to be built over Big Otter Creek for the Tilsonburg, Port Burwell & Pacific.

Wichita Falls, Tex.—It is said that work will soon be begun on a new bridge on the Gainesville, Henrietta & Wichita Falls Division on the Missouri, Kansas & Texas at this place.

Williamsport, Md.—A new bridge over the Potomac River at this place is contemplated at a cost of about $35,000.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Delaware & Hudson, quarterly, 1¼ per cent., payable Dec. 15.

Buffalo (N. Y.), quarterly, 1 per cent., payable Dec. 15.

Troy (N. Y.), City, quarterly, 1 per cent., payable Dec 16.

Stockholders' Meetings.

Meetings of the stockholders of railway companies will be held as follows:

Rome, Watertown & Ogdensburg, annual, for election of directors, New York, Dec. 28.

Ulster & Delaware, annual, for election of directors, Rondout, N. Y., Dec. 7.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds its formal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Boston Society of Civil Engineers* meets at 715 Tremont Temple, Boston, on the third Wednesday in each month, at 7:30 p. m.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The *Chicago Electrical Association* meets at Room 1737 Monadnock Building, Chicago, on the first and third Fridays of each month, at 8 p. m. J. R. Cravath, Secretary.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Civil Engineers' Society of St. Paul* meets on the first Monday of each month, except June, July, August and September.

The *Denver Society of Civil Engineers* meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

The *Engineers' Club of Columbus, (O.)*, meets at 12½ North High street, on the first and third Saturdays from September to June.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m., except during July and August.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Society of Western New York* holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The *Engineers' Society of Western Pennsylvania* meets at 410 Penn avenue, Pittsburgh, Pa., on the third Tuesday in each month, at 7:30 p. m.

The *Locomotive Foreman's Club* meets every second Tuesday in the clubroom of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Tuesday of each month.

The *New York Railroad Club* meets at 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *North-West Railway Club* meets on the first Tuesday after the second Monday in each month, at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *St. Louis Railway Club* holds its regular meeting on the second Friday of each month, at 3 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is secretary.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p. m.

The *Western Society of Engineers* meets in its rooms on the first Wednesday of each month, at 8 p. m., to hear reports, and for the reading and discussion of papers. The headquarters of the Society are at 1736–1739 Monadnock Block, Chicago.

National Association of Manufacturers.

The third annual convention of the National Association of Manufacturers of the United States will be held at the Waldorf-Astoria, New York City, Jan. 25, 26 and 27, 1898. The convention committee, appointed at a meeting held in New York City, Nov. 24, consists of William Brookfield, Frederick G. Bourne, E. A. McAlpin, Seth M. Milliken, Charles T. Hughes, A. R. Whitney, William F. Cochran, Norton P. Otis, Charles E. Bigelow, Henry B. Haigh, Lowell M. Palmer, William Barbour, Addison C. Rand, Philip T. Dodge, Frank S. Witherbee, George H. Robinson, Edward R Ladue and Richard Young; Charles A. Schieren, President; Augustus G. Paine, Treasurer, and Charles E Locke, Secretary.

American Society of Civil Engineers.

The opening of the new house on Wednesday of last week, concerning which we wrote in our last issue, was a very successful affair. The addresses by the President of the Society, by General Craighill, Dr. Schurman and Mr. Choate were all excellent, and that of Mr. Choate was particularly sympathetic and was greatly enjoyed. The audience room was full, as was the hall outside. The assembly and dance in the evening was well attended, although the house is so spacious that it was not crowded. The house is very beautiful and commodious and was greatly admired.

On Wednesday evening of this week a regular meeting of the Society was held in the new house, at which Mr. William Cain presented a paper on the "Theory of the Ideal Column." This was printed in October Proceedings.

On Dec. 15 a paper will be presented by Mr. Spencer Miller, entitled "A Problem in Continuous Rope Driving." This paper is printed in the November Proceedings.

Discussion on Mr. Purdy's paper on "Fireproof Buildings" will be closed Dec. 15 and discussion on Mr. Branner's paper on "Geology in Its Relations to Topography" will be closed Jan. 1.

The Engineers' Club of Philadelphia.

A business meeting of the Club will be held on Saturday, Dec. 4, at 8 o'clock p. m. Nominations for officers for 1898 will be made. The retiring officers are: President, Joseph T. Richards; Vice-President, Carl Hering; Secretary, L. F. Rondinella; Treasurer, George T. Gwilliam; Directors, Max Livingston, C. H. Ott and L. Y. Schermerhorn.

The papers will be: "Moving the Pennsylvania Railroad Bridge over the Schuylkill River at Fairmont Park," by Mr. Joseph T. Richards (illustrated by the electric lantern). At the meeting of Nov. 20 the President announced that the Board had decided to celebrate the Twentieth Anniversary of the organization of the Club on Dec. 17, and that a special committee had been appointed to make arrangements. The celebration would probably take the form of a supper.

Prof. Walter L. Webb presented the paper of the evening on "The Mass Curve in Earthwork Computations," and described, by the aid of lantern illustrations, the diagrammatic method of using the mass curve and making computations for grading in earthwork. This and other graphical methods of calculation were afterward discussed by Messrs. A. E. Lehman, E. M. Nichols, Joseph T. Richards, E. F. Smith, L. Y. Schermerhorn and T. G. Janvier.

American Institute of Mining Engineers.

The seventy-fourth meeting of the institute will be held at Atlantic City, N. J., beginning on Tuesday, Feb. 15, 1898. The papers of the late Lake Superior meeting are specially offered as subjects of discussion at Atlantic City, but any other papers heretofore presented are also open to such discussion. Attention is called in this connection to a paper by Dr. John R. Don, of New Zealand, on the "Origin of Certain Auriferous Lodes," which was read at the late February meeting, but has just been made ready for the press, and will be sent to members shortly. This is one of the most important contributions to the literature of its subject in the Transactions of the Institute. Other subjects, suggested by the papers of 1897, as specially worthy of further discussion, are: the handling of materials at the mine, the dock and the furnace; the sampling and assay of metallic materials; the chemistry and manipulations of the cyanide process; the physics of cast iron and steel; the concentration of ores, magnetic and other; methods of stoping, blast-furnace practice, etc.

The Council is trying to arrange for a meeting of the Institute in Mexico in the autumn of 1898, and it has issued a special preliminary circular in order to ascertain, approximately, whether this will be possible; and the prosecution of further negotiations will depend upon the reply of members.

Engineers' Club of St. Louis.

The Club met at 8 p. m., Nov. 18, with President Flad in the chair. Twenty-six members and one visitor were present.

Mr. J. A. Ockerson made a motion that a nominating committee consisting of Messrs. B. L. Crosby, William Wise, L. P. Butler, W. G. Comber and F. F. Harrington be appointed to select for the Club a list of nominees for the several offices provided for in the constitution, and to present the same at the next meeting.

Prof. J. B. Johnson made an address on "The Results of a Recent Investigation of the Relative Strength of Wooden Beams and Columns in Large and Small Sizes." This investigation was conducted at the testing laboratory of Washington University, for the Government Forestry Division. The large beams were of selected lumber, and were tested green. They were 18 to 24 ft. in length, and were 8 in. by 12 in. in section. Eight small beams, 5 ft long and 4 in. square in cross section, were made out of each large beam after it was broken. The beams were of oak, white pine, short-leaf pine and long-leaf pine. Tests were also made on large pine beams, which had been taken out of the Exposition building after 13 years of service. The average of these tests showed that the large beams had 92 per cent. of the strength of the small ones, and that the apparent elastic limit in the large beams was 97½ per cent. of that of the small ones. Large columns showed a strength of 75 per cent. of small columns. The discussion which followed was participated in by Messrs. Sterne, Kinealy, Borden, Crosby, Russell, Bouton, Flad and Ockerson.

RAILROAD LAW—RECENT DECISIONS.

NOTE.—The decisions here noted have all been rendered by the Federal Courts.

The managers of the Tennessee Centennial Exposition at Nashville secured from certain railroads the issuance of special round trip tickets to the exposition at greatly reduced rates. Such tickets were receivable for return transportation over different roads from those issuing them, but were not transferable, providing by their terms that they should be void, if presented by a person other than the original purchaser, and such purchaser was required to identify himself before agents appointed for that purpose at Nashville. Many ticket scalpers were engaged at Nashville in buying such tickets from the holders and in reselling the return portion to others for use in violation of the contract contained therein, giving a guaranty of their acceptance for passage and assisting the purchaser in fraudulently identifying himself as the original purchaser. It is held that the railroad companies were entitled to injunctions to restrain the ticket scalpers from carrying on the business of so dealing in their tickets, and that they were not to be confined to actions for damages (decided in the Circ. Ct. M. D. Tenn., August, 1897).[1]

A contract between a corporation and a workman who has received injuries while in its service, that he shall be paid a given rate of wages per month and shall render such services as he is able to furnish, without any stipulation as to duration, is not an undertaking to pay such a workman an annuity during the remainder of his life but a contract of employment by the month which may be terminated by either party at the end of any month (decided in the C. C. A. 5th Circ., June, 1897, one judge dissenting).[2]

A Tennessee statute requires overseers of public roads to erect a sign at each railroad crossing and provides that "no engine driver shall be compelled to blow the whistle or ring the bell at any crossing unless it is so designated." It is held that this statute relieves the employees in charge of a train from any duty to give warning of any kind of the approach of a train to a crossing within the state not so designated (decided in the C. C. A. 6th Circuit, July, 1897).[3]

A railroad lying wholly within a state, which transports freight, whether coming from within or without the state, between places on its own line, under a special contract limited to its own line and without dividing charges with any other carriers or assuming any other obligations to or for them, does not come within the pro-

visions of the interstate commerce act and is not bound to make any report of its business to the Interstate Commerce Commission (decided in the Circ. Ct. W. D. Mich., June, 1897).[4]

A railroad company which uses low-sided gondola cars owes to its employees a personal duty to provide such cars with strong and safe side standards, and if it delegates this duty to an employee (in this case its foreman of car repairs), it is liable for his negligence, resulting in injury to another employee, though it furnished him with proper standards (decided in the C. C. A. 3d Circ., June, 1897).[5] One judge dissents on the ground that the company was free from liability under the rule exempting a master from liability to any of its employees for injury sustained through the negligence of a fellow-servant.

The Sioux City & Northern Railroad entered into an agreement with the Dubuque & Sioux City, by which the latter granted to the former the right to cross its tracks, and the S. C. & N. agreed, as a condition of the grant, that if the statutes of Iowa, in which state both lines were situated, should be so amended as to permit trains of intersecting railroads to cross each other's tracks without stopping when safe interlocking switches had been constructed, the S. C. & N. would construct and maintain such switches at its own expense. After the crossing had been built, the S. C. & N. mortgaged its road to secure an issue of bonds without notice to the bondholders of this agreement. Subsequently, the road was placed in the hands of receivers under foreclosure of the mortgage. The statute of Iowa was amended so as to permit trains to cross the tracks of other railroads without stopping where safe interlocking switches existed, and the D. & S. C. applied to the court to require the receivers to put in such switches. The statutes of Iowa provide that one railroad may obtain the right to cross another's tracks without its consent, and also that, upon application to a court, switches and a crossing may be ordered put in and the cost equitably apportioned among the several roads concerned. It is held that the bondholders, who were equitably the real owners of the S. C. & N., were not bound by the contract to put in and maintain switches, and that the court would not be justified in compelling the receivers to carry out the contract with the D. & S. C., thereby throwing the whole expense of the construction and maintenance of the switches on the bondholders (decided in the Circ. Ct. N. D. Iowa, June, 1897.)[6]

An agreement between rival applicants for a street railroad franchise to combine in order to prevent competition between themselves or by others in procuring the franchise is void as against public policy. Equity will not interfere to compel one of the parties to share with the others the fruits of their combination (decided in C. C. A. 4th Circ., May, 1897, one judge dissenting).[7]

Where the title to a city street is in the municipality an owner of abutting property cannot obtain an injunction to restrain the construction of an elevated railroad in the street, on the ground that the ordinance authorizing it is illegal. His remedy is in an action for the damage sustained, if any (decided in the C. C. A., May, 1897).[8]

The liability imposed by the statutes of Maryland on the directors and officers of a corporation who declare dividends rendering the corporation insolvent or impairing its capital, or who make loans to stockholders, is not a liability for wrongs to property rights and interests, such that the cause of action therefor survives against the representatives of a deceased director or officer, under the statutes of New York. The statutes of New York, where this action is brought, provide that where wrong is done to the property, rights and interest of another in a case where an action might be maintained against the wrongdoer, such action survives against his representatives after his death to the extent of his estate (decided in the Circ. Ct. S. D. New York, May, 1897).[9]

[1] Nashville C. & St. L. vs. McConnell et al., 82 Fed., 65. Tenn. Coal, Iron & R., vs. Pierce, 81 Fed., 814. Southern vs. Elder, 81 Fed., 791.
[4] U. S. ex rel Int. C. C. vs. C., K. & S., 81 Fed., 783.
[5] Penn. vs. LaRue, 81 Fed., 148.
[6] Manhattan Trust Co. vs. Sioux City & N., 81 Fed., 50.
[7] Hire vs. Richmond T. Co. et al., 80 Fed., 839.
[8] Blodget et al. vs. N. W. El. Co. et al., 80 Fed., 601.
[9] B. & M. et al. vs. Graves et al., 80 Fed., 588.

PERSONAL.

—Mr. John E. Stearns, General Manager of the Boise, Nampa & Owyhee, of Idaho, has resigned.

—Mr. George L. Rhodes, General Agent of the Sea Board Air Line, at Portsmouth, Va., has resigned.

—Mr. R. L. Ford, General Freight and Passenger Agent of the Boise, Nampa & Owyhee, Idaho, has resigned.

—Hiram Litzenberg, at one time Superintendent of a section of the Pennsylvania, died at his home, West Manayunk, Pa., Nov. 26.

—Mr. Abraham Gilbert De Huff, at one time Resident Engineer of the Lebanon Valley, died at his home in Lebanon Nov. 25, aged 50 years.

—Ex-Judge Isaiah Woolston, at one time Director of the Camden & Amboy, now a part of the Pennsylvania, died at his residence in Philadelphia Nov. 22.

—Joseph J. Tillinghast, at one time Treasurer and Director of the Troy & New England (Electric) Railway Company, died at the age of 66 at his home, Troy, N. Y., Nov. 30.

—Mr. John M. Hurst, Master Mechanic of the Salt Lake & Ogden Railway, died Nov. 16 of typhoid fever. He was the inventor of the Hurst air-brake, and devised many minor improvements in railroad equipment.

—Mr. S. Awaya, M. E., of the Nippon Railway, of Japan, who spent several months in this country and in Europe in looking into the mechanical departments of railroads, will sail for Japan on the Empress of China Dec. 6.

—Mr. Joseph W. Robinson, at one time Superintendent of the White Mountain Division of the American Telegraph Company and Superintendent of the Government telegraph service during the war, died at Concord, N. H., Nov. 17.

—Col. John Laing died at his home in Baltimore, Md., Nov. 26. Colonel Laing was at one time Chief Engineer of the Union Railroad Company, now the Northern Central, a part of the Pennsylvania system, and built the Pennsylvania tunnels under the city of Baltimore.

—Mr. J. Sakurai, Purchasing Agent and Manager of Stores of the Nippon Railway, of Japan, will sail for that country on the Empress of China, which leaves Vancouver Dec. 6. Mr. Sakurai arrived in this country several months ago and after looking into the methods of buying and taking care of supplies on a number of railroads in this country and visiting manufacturers of railroad materials, went to England for the same purpose.

—Mr. William S. Langford, employed in the office of the Comptroller of the New York Central, was on Nov. 24 the recipient of a gold medal from the Life Saving & Benevolent Association, in recognition of his work in saving the lives of four passengers at Garrison's, N. Y., on Oct. 24 when a passenger car fell into the Hudson River. Mr. Langford swam from the shore with an ax, and cut a hole in the roof of the car after others had returned from the car to the shore without accomplishing anything.

—Mr. Arthur A. H. Harris, who has been District Freight Agent of the Grand Trunk at Montreal, Que., since May, 1892, was appointed Nov. 24 General Traffic Manager of the Intercolonial, with headquarters at Montreal. Mr. Harris was born at Devonshire, Eng., Oct. 15, 1855. He has been in railroad service ever since 1874, when he became Secretary to the Traffic Manager of the Grand Trunk. He occupied this position until 1887, when he was made Assistant General Freight Agent at Buffalo, and has been connected with the freight department of the Grand Trunk until receiving the above appointment.

—Mr. Charles Oliver has been appointed Chief Railroad Commissioner of the New South Wales government railroads, to succeed the late Mr. E. M. G. Eddy. Mr. Oliver was connected with the Lands Department of New South Wales from April, 1866, until his appointment as Associate Commissioner with Mr Eddy in October, 1888. Since Mr. Eddy's death in July of this year Mr. Oliver has been Acting Chief Commissioner. Mr. W. M Fehon, also one of the original Commissioners, becomes second Commissioner, and Mr. David Kirkcaldie has been appointed to fill the vacancy in the Commission. Before his appointment Mr. Kirkcaldie was Chief Traffic Manager of all the lines of the colony.

—Hon. Aretas Blood, of Manchester, N. H., died at his home in that city on Nov. 24 at the age of 81. Mr. Blood had been well known throughout the country for many years as the head of the Manchester Locomotive Works, with which establishment he had been connected since it was begun in 1853. In fact, Mr. Blood and Oliver W. Bailey were the originators of the concern. The Manchester Locomotive Works was incorporated in 1854. In 1872 the corporation absorbed the business of the Amoskeag Company, builders of fire engines, and that part of the business continues an important one. Mr. Blood had other extensive business interests in various parts of the country. He had been Treasurer of the Nashua Iron & Steel Company; a director and President of the Ames Manufacturing Company, of Chicopee, Mass.; President of the Globe Nail Company, and Treasurer of the Manchester Hardware Company, and the Amoskeag Paper Company, of Manchester, and a director of several banks. He had held many political offices, and was an elector in the Garfield and Arthur College. He was also a director of the New York & New England Railroa .

Mr. Blood was born in Weathersfield, Vt., and began his active life as a blacksmith at the age of 17, soon after becoming a machinist. He was one of the chief citizens of New Hampshire, and, having amassed a fortune, estimated at his death at from $2,000,000 to $5,000,000 was known to his intimate friends as a liberal giver to many public charities, as well as a generous man in private benefactions.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—After Dec. 1 the name "Southern Division" will be changed to the "Oklahoma Division." The change is made from the fact that there is a "Southern Division" on the Gulf, Colorado & Santa Fe, another of the system lines. This division embraces the main line from Newton, Kan., to Purcell, I. T., and the Panhandle, Florence, Englewood, and Augusta branches.

Charleston & Western Carolina.—At the annual meeting in Greenwood, S. C., Nov. 12, Gen. Samuel Thomas was made First Vice-President and Henry Crawford, formerly Vice-President and General Counsel of the road, was made Second Vice-President.

Chattanooga & Lookout Mountain.—The officials of this company, referred to in another column, are: President and General Manager, J. T. Crass, Chattanooga, Tenn.; Vice-President, J. P. Sanborn, Newport, R. I.; General Passenger Agent, V. S. Whiteside, Chattanooga; General Freight Agent, J. E. Crass, Chattanooga; Auditor, Wm. A. Bird, Lookout Mountain, Tenn.; General Counsel, W. L Frierson, Chattanooga.

Chicago & Northwestern.—C. H. Bowen has been appointed Roadmaster at Eagle Grove, Ia., to succeed D. J. Walsh, resigned.

Chicago, Peoria & St. Louis.—D. C. Frederick, Car Service Agent of the St. Louis, Chicago & St. Paul, with headquarters at Springfield, Ill., has been appointed Car Service Agent of the Chicago, Peoria & St. Louis, to succeed W. R. Bradley.

Cincinnati, Hamilton & Dayton.—L. Widdison has been appointed to succeed W. L. King as Supervisor, with headquarters at Dayton, O.

Duluth, Red Wing & Western.—At the annual meeting at Red Wing, Minn., Nov. 11, William Danforth, Jr., was elected a director to succeed H. E. Perkins, deceased.

Florida Central & Peninsular.—Capt. D. E. Maxwell has been elected Second Vice-President. He will continue as General Manager, with office at Jacksonville, Fla.

Fitchburg.—After Dec. 1 the headquarters of J. Medway, Superintendent of Motive Power, now at Boston, Mass., will be located at Keene, N. H.

Intercolonial.—Arthur A. H. Harris, heretofore District Freight Agent of the Grand Trunk at Montreal, Que., has been appointed General Traffic Manager of the Intercolonial, with headquarters at Montreal. The appointment took effect Nov. 24.

Los Angeles Terminal.—T. R. Shanks, Superintendent, has resigned. E M. Jessup has been appointed to succeed him, in addition to his former duties as Engineer, with headquarters at Los Angeles, Cal.

Luckiamute Valley & Western.—The officers of this company, referred to in another column, are as follows: President, H. S. Montgomery; Vice-President, J. I. Montgomery; General Manager, H. D. Chapman; Treasurer, A. H. Lucas. The principal office is at Falls City, Ore.

Mobile & Ohio.—Harry P. Knight, formerly Assistant Ticket Agent of the Chicago & Alton at St. Louis, has been appointed City Passenger & Ticket Agent of the Mobile & Ohio at St. Louis, Mo., to succeed Mr. Frank J. Egan, promoted.

New Orleans & Northeastern.—George H. Smith, formerly Assistant General Passenger Agent of the Cincinnati, Hamilton & Dayton, has been appointed General Passenger Agent of the New Orleans & Northeastern, with headquarters at New Orleans, La.

New York, Philadelphia & Norfolk.—William H. Wheeler, formerly Chief Clerk to B Courlaender, Jr., District Passenger Agent of the Pennsylvania at Baltimore, Md., has been appointed Traveling Passenger Agent of the New York, Philadelphia & Norfolk with headquarters at Philadelphia.

Northern Pacific.—Joseph McCabe, Superintendent of the Pacific Division, with headquarters at Tacoma, Wash., has resigned. His successor will be E. J. Pearson, Superintendent of the Rocky Mountain Division. To take effect Dec. 1.

Oregon Railroad & Navigation Co.—R. C. Judson, of St. Paul, has been appointed Industrial Commissioner, with headquarters at Portland, Or.

Plant System.—At the annual meeting of the Charleston & Savannah, at Charleston, Nov. 19, M. F. Plant was elected a director in place of Mr. E. R. Memminger, of Charleston. Charles L Sprague, formerly Traveling Passenger Agent for the Detroit & Cleveland Boat Line, has been appointed Traveling Passenger Agent for the Plant System, to succeed Jno. B. Groff, headquarters at Philadelphia.

St. Louis, Chicago & St. Paul.—W R. Bradley, Car Accountant of the Chicago, Peoria & St. Louis, has been appointed Car Accountant of the St. Louis, Chicago & St. Paul, with headquarters at Springfield, Ill., to succeed D. C. Frederick.

San Antonio, Llano & Northern.—The officers of this company, whose incorporation is noted in another column, are as follows: N. R. Lindsey, President; J. M. Prester, Vice-President and General Manager; Wm. Martin, Treasurer, and J. F. McCarty, Secretary, who, with L. B. Russell, G. H. Hodge, W. F. Cummins, R. V. Neely and W. W. Johnson, are the incorporators.

Seaboard Air Line.—L. S. Allen, formerly Assistant General Passenger Agent of the Baltimore & Ohio at Chicago, has been appointed General Agent of the Seaboard Air Line, with headquarters at Washington, D. C., the appointment to take effect Dec. 1.

Toronto, Hamilton & Buffalo.—E. Fisher, Assistant Superintendent of the Michigan Central at Jackson, Mich., has been appointed General Superintendent, with headquarters at Hamilton, Ont., to succeed R. H. L'Hommedieu, resigned. Frederick F. Backus has been appointed General Freight and Passenger Agent, with office at Hamilton, Ont., to succeed O. W. Ruggles. General Passenger Agent, and W. Macmillan, General Freight Agent resigned. The following offices have been abolished: Division Superintendent, Assistant Superintendent, Superintendent of Telegraph, General Car Agent, Superintendent of Motive Power and Equipment, Purchasing Agent, General Freight Traffic Manager, General Agent. Appointments and changes to take effect Dec. 1.

Wabash.—H. S. Pritchett, Superintendent of Time Service and Watch Inspection, having resigned to accept the Superintendency of the United States Coast and Geodetic Survey, the duties of that office are assigned to the Superintendent of Telegraph, G. C. Kinsman, with headquarters at Decatur, Ill. Appointment and change to take effect Dec. 1.

Wheeling & Lake Erie.—John Brown Braden, formerly General Foreman at the shops of the Pennsylvania lines at Columbus, O., has been appointed Superintendent of Motive Power in place of O. P. Dunbar, deceased. The office will be transferred from Norwalk to Toledo, O.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Aroostook Northern.—Tracklaying has been completed on the entire line from Caribou, Me., east 15½ miles to Limestone, and regular train service began Dec. 1. Work is nearly completed on the bridges and trestles, and nearly all the men engaged in building have been discharged. This road is practically a branch of the Bangor & Aroostook, although operated under a separate company. Albert A. Burleigh, Houlton, Me., is President.

Asbestos & Danville.—This road, to connect the lines of the Asbestos & Asbestic Co., of Asbestos, Que., with the Grand Trunk at Danville, 4¾ miles east, has been completed. The line is owned and was built by the Asbestos & Asbestic Co. It has a maximum grade of 2 deg. and maximum curves of 10 deg. (See this column under Danville & Asbestos for June 25.)

Atlanta, Knoxville & Northern.—The 26 miles of branch line from Blue Ridge, Ga., to Murphy, N. C., have been made standard gage, thus making the entire line of 230 miles standard.

Atlantic Coast Line.—Grading is now in progress on the Southeastern section of this line from Elrod, N. C., southeast 10.98 miles to Ashpole. Work is being done by the company's own forces. (See this column for Nov. 12.)

Atlantic & Lake Superior.—Grading has been completed on 18 miles of the Baie des Chaleurs Division from Caplin northeast to New Carlisle, Que., and tracklaying is now going on. Ballasting will not be done until spring, but regular train service will be put on about Jan. 1. The only important bridge is over the Bonaventure, which is now approaching completion. About 400 men are at work, for the most part under the direction of the company. It is the intention to extend the line during the winter to Paspebiac, which will involve heavy rock work. The building of wharves and terminal facilities will also be commenced at that point. The road when completed is to extend from St. Mary's River, Ont., to Gaspe Bay, Que. Construction has been completed at several points along the line and about 100 miles are now in operation. (See this column for Nov. 19.)

Augusta & Atlanta.—This company has been incorporated in Georgia to build a road from Augusta west to Atlanta, about 150 miles. It is said to have been incorporated in the interests of the Charleston & Western Carolina.

Baltimore & Ohio.—The extensive improvements on the Pittsburgh Division at Falls Cut (for full description of which see these columns for Nov. 5) will be completed by the middle of December. The only work now carried on at that point is the grouting of the packing

of the tunnel. This will complete all the improvements at present projected on this line. The following pieces of work have been completed and are in operation: The yards at Locust Point, Cumberland, Glenwood and Pittsburgh; improvements at North Mountain, Seven Curves, Doe Gully, and the Pittsburgh terminals. (For full descriptions of these works see these columns for Oct. 15, Nov. 5 and Nov. 12.)

Baton Rouge & Central Louisiana.—At a special election held at Natchitoches, La., a 5-mill tax for 10 years was voted in aid of this road, which is projected to run from Baton Rouge northwest through Simsport, Marksville and Alexandria to the Texas state] line in Vernon Parish. Quarantine regulations have interfered with active prosecution of work. F. M. Welsh, Baton Rouge, La., is President. (See this column for March 19.)

Boston & Albany.—The engineers of the company have made surveys for a shorter line between Jamesville, Mass., and East Brookfield, but officers of the road state that no definite action has been taken toward building the line. The present line of the road between these two points is about 16 miles long, though the two places are only about 10 miles apart, but a more direct route would be very costly and probably involve a long tunnel. The existing line is a continuous ascending grade of about one per cent. from Jamesville to Charlton and a descending grade of about the same rate from Charlton to East Brookfield.

California Southern.—According to report 23 miles of this road has been graded and 16 miles of track laid from Kramer, Cal., on this line north 27 miles to Randsburg. A. A. Dougherty, Los Angeles, Cal., is President. (See this column for Nov. 19.)

Carthage.—Grading has been completed for 8½ miles between Carthage and Hallison, N. C., and track is now laid from Carthage to Mooshaunee, N. C. It is expected that regular train service will be put on this section Jan. 1. The road as projected is to extend from Carthage north about 12 miles to Island Ford. W. C. Petty, Carthage, N. C., is Lessee and General Manager. (See this column for Oct. 15.)

Chattanooga & Lookout Mountain.—A new charter has been obtained changing the title of this road, which was sold June 22 to the Lookout Incline & Lula Lake Co (see these columns for June 25), from Chattanooga & Lookout Mountain Railway to Chattanooga & Lookout Mountain Railroad. Extensive improvements have been made in replacing new ties, trusses, etc., and it is expected to extend the road 6 or 7 miles next year. The names of officers are given in another column.

Chicago, Burlington & Quincy.—It is reported that W. S. Heckart has been awarded the contract for building a spur of about 1¼ miles from Aztec, S. D. The maximum grade will be three per cent. and maximum curves 12 degrees.

Coast Railway of Nova Scotia.—The portion of the section of this road from Yarmouth to East Pubnico, N. S., 31 miles, is now completed and regular train service is in effect. Twenty miles, from East Pubnico to Barrington, are now under construction, of which four miles of grading and masonry have been completed to Lower East Pubnico. The bridges on this 20-mile section are as follows: A 20-ft. girder at Hardings Brook on the 37th mile, a 20-ft. girder on the 39th mile, a 60-ft. through plate girder over Shag Harbor River on the 46th mile, 30-ft. deck plate girder over Atwood's Brook on the 47th mile and a 60-ft. through plate girder over Fresh Brook on the 49th mile. Masonry has been completed for the abutments of the first two. The contract for this 20-mile section has been sublet to H. J. Townsend & Co., of New Glasgow, who will complete it for operation by June 30, the contractors to supply everything except the rails and rolling stock. The contractors for the entire road to Lockport, 97 miles, are the Nova Scotia Development Co., of which G. Martin Brill, of Philadelphia, is President. It is intended to begin work on the next section early next season. With the completion of the line to Barrington a steamer will be put on the route from that point to Halifax, and as the line is completed to Shelbourne, Lockport and Liverpool this steamer will connect with the railroad at these points. L. H. Wheaton, Yarmouth, N. S., is Superintendent. (See this column for Oct. 29.)

Columbus Northwestern.—It is stated that 18 miles of road has been graded and 180 teams are now at work between Bellefontaine and St. Mary's, O. It is expected to have trains running by Jan. 15. The road as proposed is to extend from St. John, a point on the Ohio Southern, southeast 53 miles through Bellefontaine to Marysville. J. T. Adams, Waverly, O., is General Manager.

Cripple Creek Short Line.—This company was incorporated in Colorado, Nov. 16, with a capital stock of $1,500,000 to build a railroad from Colorado Springs west through Bear Creek Canon, Seven Lakes and Dead Lake to Cripple Creek, about 40 miles. It is stated that eight miles of the right of way out of Colorado Springs and much of the remaining right of way has been purchased. The incorporators and first Board of Directors are as follows: Woodman S. Eaton, Franklin D. Rogers and Herbert A. Clay, of Portland, Me., and John I. Franklin and Harry B. Stone, of Colorado Springs.

Detroit & Northern.—This company was incorporated in Michigan Nov. 12 with a capital stock of $256,000 to build a road from Mt. Clemens, Mich., northeast 32 miles to Port Huron. The incorporators are: Fred Woodbourne, John Townsend, Luther S. Cushing, Arthur P. Lothrop, St. Paul, Minn.; George E. Smith, Clarence A. Lightner and Edwin Denby, Detroit, Mich.

Detroit & St. Clair River.—It is stated that James G. Tucker, of Mt. Clemens, Mich., Receiver, has been authorized to issue $60,000 in receivers' certificates to complete the road from Chesterfield east to Algonac, Mich., about 18 miles, and that work will begin at once.

El Paso & Northeastern.—It is reported that work has been begun on this road from El Paso, Tex., northeast 165 miles through New Mexico to White Oaks. The contract, as stated last week, is let to George S. Good & Co., of Lock Haven, Pa.

Galveston, Brazos & Southwestern.—Grading is now in progress from Galveston west 42 miles to Angleton in Brazoria County, Tex., and will be completed about Jan. 1. The line is to be extended to San Antonio. L. A. Beadle, Galveston, is Chief Engineer. (See this column for Sept. 24.)

Georgia Pine.—Grading on this road has been completed from Bainbridge north to Corea, 25 miles, and the tracklaying to Colquit, 20 miles. One hundred and twenty-five men are now at work. The road as projetced is to be extended to Arlington, in all 39 miles R. B. Coleman, Bainbridge, Ga., is General Manager (See this column for Oct. 29.)

Grand Haven & Southeastern.—This company was incorporated in Michigan Nov. 8 with a capital stock of $100,000 to build a line from Grand Haven south 4 miles. The incorporators are: G. A. Morrison, C. J. Hanly, Ernest H. Riehl, H. A. Hensley, E. G. Megrue and N. E. Matthews, New York City; W. C. Brown, Fastoria, O.

Kansas City, Pittsburgh & Gulf.—It is reported that engineers are surveying for a branch of this road from the main line at Redland, I. T., northeast 15 miles to Fort Smith, and that contracts for grading have been let to Bernard Corrigan, of Kansas City, Mo. According to report work is to begin at once.

Kansas City, Excelsior Springs & Northern.—This company has been incorporated in Missouri with a capital stock of $100,000 to build a road in St. Clair County, Mo., from Excelsior Springs Junction on the Wabash north 10 miles to Excelsior Springs. The incorporators are: Breckinridge Jones, Erastus L. and E I. Moore, S. D. Henry, Frank Hagerman and Edward C. Wright.

Luckiamute Valley & Western.—It is reported that the entire line of this company has been surveyed and that grading is in progress from Falls City, Or., to Lees. The road as projected is to extend from Falls City to Salem, 23 miles. The officers are given in another column.

Lake Manitoba Railway & Canal Co.—Track has been laid on the extension of this company's line from Sifton, Man., northeast 23 miles to Lake Winnepegosis, and ballasting has been more or less completed throughout. Regular train service began Oct. 8 for the whole distance from Gladstone Junction north to Lake Winnepegosis, 123.4 miles. This extension opens up a new district to the fishing industry.

Marinetta, Hocking & Northern.—It is reported that surveys have been begun for an extension of this road from Adelphi, O., northeast about 15 miles to a point on the Columbus, Hocking Valley & Toledo. The present road extends from Adelphi west to Kingston, 10.3 miles, and was reorganized in 1893 as the successor of the Kingston & Adelphi. Alexander Kenick, Chillicothe, O., is President.

Missouri Pacific.—The statement made in this column two weeks ago is officially confirmed that surveys are being made for a connecting line from Little Rock, Ark., west to Greenwood, the terminus of the Fort Smith Branch, about 165 miles. But the question as to whether the company will build the line is yet to be determined by action of the Board of Directors.

Munising.—This road, notice of whose completion was given in this column Nov. 12, was opened for traffic Nov. 29. No more construction will be done this winter, but it is expected that contracts will be let for further work next year. The proposed extensions are about 100 miles southeast to Indian Lake, Mich., and about 140 miles northeast along the south shore of Lake Superior.

Norfolk & Western.—Work is in progress on four miles of second track between Bluefield and Ada, W. Va. The necessary arch masonry was built several years ago. The weight of rail used is 85 lbs., the same as that on the main track on the same division. L. H. Vaughan & Co., of Roanoke, Va., hold the contract.

Orange, Call & Pine Belt.—Grading and tracklaying have been completed from Salem, Tex., north 14 miles to Call, and regular train service has been established between these points. The present equipment is 3 locomotives, 56 freight cars and 2 passenger cars. About 150 men are now at work on the extension which is being built through Orange to Jasper, in all 75 miles. (See this column for Oct. 15.) Dennis Call, of Orange, Tex., is President.

Oregon Improvement Co.—The Columbia & Puget Sound line from Seattle, Wash., to Coal Creek, 21 miles, with branches from Renton to Franklin, 21 miles; Maple Valley to Taylor, 10 miles, and Black Diamond to Bruce, 3 miles, has been made standard gage. (See this column for June 25.) Preparations were made some time in advance, so that the change did not require more than three days for the 55 miles of track. The minimum weight of rail is 56 lbs.

Pontiac Pacific Junction.—It is reported that this company has ordered 12 miles of rails for the extension of its road northeast from Aylmer, Que., to Hull, and that work is to begin at once. The road is also to be extended across the Ottawa River to Pembroke, which will necessitate the building of bridges at Allumette Island. The entire line from Hull to Pembroke must be completed by July 3, 1898. G. C. Dunn, of Ottawa, Ont., is acting Chief Engineer. (See this column for Nov. 5.)

Potomac Short Line.—This company has been incorporated with a capital stock of $250,000 in West Virginia, to build a line from a point on the Baltimore & Ohio, near Hancock Station, W. Va., to the bank of the Potomac. The incorporators are: T. N. B. Dawson, of Berkeley Springs, W. Va.; M. T. Ingless, of Martinsburg, W. Va.; P. E. Dawson, James H. Bowles and J. F. Fields, of Hancock, Md. The principal office of the company will be at Berkeley Springs. It is stated that the intention of the company is to complete surveys this winter and to begin work in the early spring.

Quakertown & Eastern.—Work is being carried forward on this line, which is to extend through Bucks County, Pa., from Quakertown, a point on the Philadelphia & Reading, northeast to Richlandtown, 2½ miles; to Pleasant Valley, 6 miles; Springtown, 9 miles, and Durham, 12 miles, terminating at Rigelsville, making the total length 15 miles. Surveys have been completed for the entire length and the contract for construction is held by H. F. Baker, of Quakertown. Grading has been completed from Quakertown to Springtown, and track has been laid as far as Pleasant Valley, six miles. It is expected that track will be laid to Springtown and trains running within two weeks. One hundred men are now at work. The difficult part of the work has been completed, the maximum grade being 50 ft. and curves 10 deg. There are three steel bridges over Cook's Creek, 50 to 100 ft. long, and one steel bridge over Tohickon Creek 75 ft. long. John Jameson, Quakertown, Pa., is President and Henry Shelby Engineer.

St. Louis, Peoria & Northern.—Grading has been completed for the entire extension from Springfield, Ill., north to Peoria, 63 miles, and tracklaying with 75-lb. rails to San Jose, 35 miles. It is expected to begin ballasting immediately and to open up a through train service of three trains each way between St Louis and Peoria Dec. 15. Bridges are completed with the exception of one span. The James A. Ware Construction Co., of Springfield, has the contract for earthwork; Burnet & Brutus, of St. Louis, for the timber, and the Phœnix Bridge Co. for the bridges. (See this column for Sept. 24.) All equipment for the extension has been purchased and delivered.

San Antonia, Llano & Northern.—This company was incorporated in Texas Nov. 27, with a capital stock of $300,000, to build a line from Strawn, in Palo Pinto County, a point on the Texas & Pacific, south about 45 miles to Comanche, on the Fort Worth & Rio Grande. The officers are given in another column.

Seaboard Air Line.—The work of laying 68-lb. rails on the Central Division main line from Raleigh, N. C., outhwest to Hamlet has been practically completed, thus making the rails on the entire line from Portsmouth, Va., and Weldon, N. C., to Charlotte and Atlanta, of practically uniform weight.

Short Line.—This company, which proposes to build a line from Clarksburg, W. Va., northwest about 25 miles to New Martinsville, on the Ohio River, unexpectedly began work Nov. 18 in the streets of Clarksburg. About 100 men and 20 teams are working in three shifts for the entire 24 hours. The City Council has attempted by ordinance to stop the work, but this move was prevented through an injunction obtained by the railroad.

Tallahassee Southeastern.—It is reported that work has been begun on this road, which is projected to run from Tallahassee, Fla., southeast through Oldtown to Gainesville, Fla., about 150 miles. Seven miles, from Tallahassee to Lake Como, were completed, and about 40 miles additional graded in 1893. Edward Lewis, of Tallahassee, is President.

Toledo & Ohio Central.—This company has purchased 2,000 tons of rails, Am. Soc. C. E. standard. These will be laid between Findlay and Toledo. O., on the Western Division, and between Hatton and Fostoria, about four miles, on the Eastern Division. (See this column for Nov. 12.)

Wisconsin & Michigan.—It is officially stated that the two miles of track between Fisher and Kells, Mich., is to be laid with 60-lb. rails instead of 70-lb. rails, as stated in this column Nov. 19. This makes the 60-lb. rail the minimum between Peshtigo Harbor, Wis., and Faithorn Junction, Mich.

Electric Railroad Construction.

Belleville, Ill.—The St. Louis-Belleville Suburban Railway Co., with main office at East St. Louis, has been incorporated with a capital stock of $350,000 by George Townsend, W. S. Reed, W. N. Horner, of Chicago; A. S. Wilderman, of Belleville, and John Nienes, East St. Louis. The incorporators have also been elected as the first Board of Directors.

Bobcaygeon, Ont.—A proposition has been made to the County Council to build an electric road between Fenelon Falls and Peterborough, and a committee has been appointed to obtain information regarding cost of construction, route, etc.

Brooklyn.—It is stated that the refusal of the State Railroad Commission to approve the application of the Greenbush & Nassau Railroad for an increase in its capital stock will not interfere with the progress of the construction of the road. The road has been graded from Greenbush to Nassau and a trestle on the Greenbush flats is being built. The company proposes to issue $325,000 bonds to be secured by the first mortgage on all assets to the equipment and rolling stock. It is stated that about $56,000 has been subscribed by local investors on an issue of stock already made.

The Brooklyn Board of Aldermen on Nov. 29 granted franchises amounting in all to nearly $16,000,000. The East River & Atlantic Ocean Railroad Company received rights to build on about 50 miles of street with the condition that the company pay three per cent. of its gross receipts to the city and give six tickets for 25 cents. It is believed that the Mayor will veto the resolution.

Buffalo, N. Y.—Mr. H. H. Littell, General Manager of the Buffalo Railway Co., states that work will be resumed on restoring the tracks on Seneca street and for the running of cars to South Buffalo. The grade crossings on a number of the streets have been finished.

Chicago.—At a meeting of the City Council Nov. 22, Mr. Charles T. Yerkes applied for an extension of the time in which he must complete the Northwestern Elevated Railroad. The original ordinance granting a franchise to this road provided that it must be finished by Dec. 31, 1897, and an extension is now asked until July 1, 1899. The question of the proposed extension was referred to the Committee on Streets and Alleys North.

A press dispatch from Chicago states that Charles T. Yerkes has succeeded in financing the Northwestern Elevated Railroad in New York, and although the details of the loan have not been made public yet the announcement seems to be made on good authority that the money necessary for the completion of the road will be obtained as rapidly as required. The report further states that the necessary iron will be ready before spring, when construction work will be begun.

Doylestown, Pa.—On Nov. 19 a charter was issued at Harrisburg to the Doylestown & Willow Grove Traction Co., with a capital stock of $10,000, to build roads in Bucks, Montgomery and Philadelphia counties. The incorporators are: W. N. Walmsley, Carroll R. Williams, Joseph Jones, of Philadelphia; Samuel Steckel and George P. Brock, of Doylestown.

Indianapolis, Ind.—The Indiana Traction Co. has completed its organization. The directors are: Maj L. N. Downs, Battle Creek; Frank A. Maus, N. J. Clodfelter and Charles G. Lohman, Indianapolis; C. S. Cleaver, Chicago; Dee Allen, Battle Creek; W. R. Pearson, Fairmount. The directors elected officers as follows: President, L. N. Down; Vice-President and General Superintendent, N. J. Clodfelter; Secretary, Charles G. Lohman; Treasurer, Dee Allen; General Manager, C. S. Cleaver; Assistant General Manager, W. R. Pearson. Work was begun on the road at Fairmount last week and next week men will be put at Jonesboro and Gas City. The line between these three places it is hoped will be completed by Dec. 15. The line now decided upon will take in the following places: Marion, Gas City, Jonesboro, Fairmount, Summitville and Alexandria. From Alexandria the road will pass through Orestes to Elwood. In the spring there is talk of building to Indianapolis by way of Noblesville.

Manistee, Mich.—G. A Hart, President of the Manistee, Filer City & Eastlake Railway Co., writes that they propose to build three miles of road in 1898.

Mansfield, Mass.—The Norfolk Southern Street Railway Co. has been incorporated, with a capital of $150,000 The directors are John C. Lane, of Norwood; Robert S. Gray, of Walpole; Joseph J. Feeley, of Walpole; Edward F. Draper, of Boston; George S. Forbush, of Brookline;

Frederick S. Lane, of Foxboro; Aaron R. Sanderson, of Boston. The road will run from the junction of Washington street and Railroad avenue on Norwood, through Walpole and Foxboro to the railroad station in Mansfield, 17 miles.

Middletown, Mass.—The Middletown & Portsmouth Railroad Co. has been organized with a capital stock of $200,000 to build an electric road connecting Newport and Fall River.

New Rochelle, N. Y.—The Railroad Committee of the Board of Aldermen gave a hearing on Nov. 29 on the application of the Pelham Park Railway Co. for a franchise to build an electric road through Pelham Bay Park. According to the terms of the franchise asked for the road is to run from New Rochelle through Pelham Bay Park, along the shore road and across Pelham bridge and follow the Eastern Boulevard to Westchester. No action has been taken on granting the franchise.

Parkersburg, W. Va.—The Parkersburg & Suburban Electric Railway Company, the chartering of which was noted in the *Railroad Gazette* last week, on Thursday last closed a deal with the Park City Street Railway Co., of Parkersburg, whereby the new company secures the tracks, franchises and real estate of the Park City Co., the price paid being $20,0 0. The new company has employed Brown & Hazlett, of Wheeling, W. Va., to prepare plans for the new line, select routes and superintend the engineering and construction departments of the work. It is believed the road can be put in operation by June 1 next.

Philadelphia.—The President of the Philadelphia & Westchester Traction Co., with offices at 672 Bullitt Building, Philadelphia, informs us that it is proposed to build on the Westchester road a line passing through Milltown and subscriptions will soon be taken for the stock for this portion of the road.

A committee of the Board of Highway Supervisors has approved the plans of the Union Traction Co. for the temporary extension of the Thirteenth and Fifteenth streets line on Broad street to the League Island Navy Yard. The committee will report the plans to the next meeting of the board with a favorable recommendation.

Pittsburgh.—The Mayor has vetoed the ordinance passed by the councils granting the Allegheny City Traction Co. the right to lay switches in different streets for the purpose of connecting several roads controlled by a new syndicate. The veto is based on the company's refusal to grant transfers which would enable passengers to ride from the eastern part of Allegheny to the western part on one fare.

Port Jervis, N. Y.—The Port Jervis Electric Railroad Co. is pushing the work of construction of its road in Port Jervis along Ball street.

St. Louis.—The Lindell Railway Co. is making surveys for its Crevecouer Lake line, which, it is hoped, will be in operation some time this winter. This road is entirely in St. Louis County and will probably connect with the lines of the Lindell road over the Delmar avenue and Forest Park divisions.

A report from St. Louis states that arrangements were made Nov. 25 for a complete transfer of the St. Clair turnpike to the St. Louis & Suburban Electric Railway Co., and the latter company proposes to push the work of building the road to an early completion.

Saluda, S. C.—Our correspondent informs us that local capitalists and business men have decided definitely to build an electric road in Saluda, which may be extended to a point on the Southern Railway, either Ridge Springs or Johnstown. A mass meeting was held last Friday for the purpose of effecting a permanent organization and to allow others to invest in the enterprise.

South Bethlehem, Pa.—A large force of men is at work on the extension of the South Bethlehem & Hellertown electric line from Main and Durham streets, Hellertown to Rentzheimer Grove, a distance of ¾ of a mile.

Toronto, O.—A movement has been set on foot by representatives of the interests which control the trolley line from Wellsville to East Liverpool for an extension of the road to Toronto, O. The plan contemplates building the road from Toronto on to Steubenville, nine miles further south, thus giving a direct trolley line from Stubenville to Wellsville, along the Ohio River. The scheme has not taken any definite form, but inquiry has been made as to cost of construction, and the practicability of the right of way that can be easily secured. Manufacturers of Toronto and Liverpool will make an effort in connection with the proposed road, to have it haul freight as well as passengers, and give them connection at Steubenville with the Wheeling & Lake Erie and the Pittsburgh, Cincinnati, Chicago & St. Louis Railroads. They are now dependent on the Cleveland & Pittsburgh for this service.

Toronto, Ont.—Messrs. Ritchie, Ludwig and Ballantyne, solicitors, give notice that application will be made as the next session of the Legislature to incorporate the Toronto & York Radial Railway Co., with power to purchase the franchise and property of the Metropolitan Street Railway, Toronto Belt Line Railway, Toronto, and Mimico Railway, and other roads within a radius of 100 miles of Toronto, and to construct steam or electric roads.

Tottenville (S. I.), N. Y.—The Midland Railroad Co. has presented to the Board of Supervisors an application for the right of way to build a line over the Fresh Kill road to Tottenville, and also to build a double-track road from Grant City to New Dorp.

Washington, D. C.—On Nov. 15 the work of equipping the lines of the Capital Traction Co. with electricity was begun by Mr. E. Saxton, general contractor. The engines have been purchased from the E. P. Allis Co., and the generators from the General Electric Co., the latter furnishing all the electrical installation. The generators are 573 KW. machines of 600 volts. The insulated feeder cables are to be furnished by J. Roebling's Sons Co., of Trenton.

Wilmington, Del.—Work has been begun on the Wilmington & Brandywine Springs Electric Railway, which will run between the places mentioned in the title, a distance of about 5 miles. Jacobs & Vandegrift, Philadelphia, have been granted the contract for building the line.

GENERAL RAILROAD NEWS.

Atlantic Coast Line.—At annual meetings of the stockholders of the Wilmington & Weldon and the Wilmington & Newbern, both lines of the Atlantic Coast Line, held in Wilmington, N. C., Nov. 17, it was voted to consolidate the two companies.

Atchison, Topeka & Santa Fe.—The earnings for October and for the four months ended Oct. 31 were as follows:

October:	1897.	1896.	Inc. or Dec.
Gross earn	$3,695,379	$3,302,791	I. $392 688
Oper. expen	2,407,251	2.150,362	I. 256 889
Net earn	$1,288,128	$1,152,429	I. $135,799
Taxes and rentals	142,980	163.3 2	D. 20 402
Balance	$1,145,148	$988,917	I. $156.2 1
Four months:			
Gross earn	$12,907,405	$11,257,135	I. $1,670,270
Oper. expen	9,189,659	7,916.076	I. 1,271,983
Net earn	$3,739,346	$3,341.059	I. $398,287
Taxes and rentals	565,600	698 899	D 153.249
Balance	$3,173,746	$2,642,160	I. $-31.586

Baltimore & Ohio.—The earnings for October and for the four months ended Oct. 31 were reported as follows:

October:	1897.	1896.	Inc. or Dec.
Gross earn	$2,365,107	$2.572.716	D. $6 639
Oper expen	1 616,387	1.859,105	D. 242,718
Net earn	$749,729	$513,641	I. $236,079
Four months:			
Gross earn	$9 417.178	$9,157,332	I. $264,816
Oper. expen	6,700,237	6,795,907	D. 95.670
Net earn	$.,716,941	$2,356,425	I. $360,516

The Receivers will pay the interest on $5,956,000 receivers' certificates and on $4,500,000 Schuylkill River east side railroad bonds due Dec. 1, but payments of the coupons of $6,681,804 Chicago Division five per cents of 1897 and of the $8,500,000 terminal five per cents. of 1894 will be deferred, thus taking advantage, as in June last, of the provisions in these bonds which permit of deferred payments for three months.

Baltimore & Ohio Southwestern.—The annual report for the year ending June 30 last shows a loss of $318,395 in gross earnings, of which $229,495 was in passengers. The general results for two years follow:

Year:	1897.	1896.	Inc. or Dec.
Gross earn	$6,140,000	$6,458,395	D. $318,395
Oper. expen	4.257,304	4,288,325	D. 31 021
Net earn	$1,882,696	$2,170,070	D. $287,374
Other receipts	2,250	9,599	D. 7,349
Total net earn	$1,884,946	$2,179,669	D. $294,723
Charges	2,154 292	2,115.780	I. 38 512
Balance (def.)	$269,346	$63,889	D. $353,235

The road is an important soft coal carrier, and its earnings were affected by the coal strike at the beginning of the fiscal year. But besides this and the general depression in business, the company lost heavily by the March floods, which not only did large damage to its property, costing $105,000 to repair, but caused a loss of revenue estimated at $250,000. There has been an improvement in the train load during the year of 21 tons, bringing it up to 212 tons. While there was a decrease of 385,281 tons in the amount of freight carried, there was an increase of 5¼ per cent. in ton miles, but freight train mileage decreased 4.66 per cent.

The most important financial operation of the year was the funding of the 6½ millions of the Ohio & Mississippi six and seven per cent. bonds at four per cent., reducing the company's annual interest charge by $192,500.

Central of Georgia.—The earnings of October and for the four months ended Oct. 31, were as follows:

October:	1897.	1896.	Inc.
Mileage	1,523.71	1,459.14	64.57
Gross earn	$617,787	$590,944	$26,843
Oper. expen	334,309	322,304	12,005
Net earn	$283,478	$268,640	$14,838
Four months:			
Gross earn	$1,8 9,282	$1,824,956	$34,326
Oper. expen	1,183,074	1,179,460	3,614
Net earn	$376,208	$645,496	$30,712

Canadian Pacific.—The earnings for October and for the ten months ended Oct. 31 were reported as follows:

October:	1897.	1896.	Inc.
Gross earn	$2 790,000	$2,121,650	$668 350
Oper. expen	1,375,262	1,182,009	193,253
Net earn	$1,414,738	$939,641	$475,097
Ten months:			
Gross earn	$20,186,340	$16,790,979	$3,395,361
Oper. expen	12,125,752	10,469,977	1,655,775
Net earn	$8,060,588	$6,321,002	$1,739,586

Central of New Jersey.—The earnings for October were reported as follows:

October:	1897.	1896.
Gross earn	$1,230,733	$1,263,867
Oper. expen	698,848	714.204
Net earn	$531,885	$549,663

Chesapeake & Ohio.—The earnings for October and for the four months ended October 31 were reported as follows:

October:	1897.	1896.	Inc.
Gross earn	$1,000,527	$892,510	$108,017
Oper. expen	677,586	578,410	99,176
Net earn	$322,941	$314,100	$8,841
Four months:			
Gross earn	$3,902,459	$3,464,676	$437,783
Oper. expen	2,573,159	2,256,507	317,652
Net earn	$1,329,300	$1,208,169	$120,131

Chicago & West Michigan.—The directors have voted that the coupons of five per cent. bonds due Dec. 1 be paid $20 in cash and $5 in 10-year coupon scrip in place of payments of cash and scrip in equal amounts as has been the custom for the past three years.

Chicago, Burlington & Quincy.—The earnings for October and for the four months ended October 31 were reported as follows:

October:	1897.	1896	Inc.
Gross earn	$1,357,251	$3,773,442	$583,809
Oper. expen	2,325,648	1.885,317	440,331
Net earn	$2,031 603	$1 888,125	$143,478
Four months:			
Gross earn	$15,628 526	$12 805,976	$2,86 .58)
Oper. expen	8,839,2 9	7,253,846	1,585,363
Net earn	$6,829,317	$5,55 ,130	$1,277,217

Chicago, Milwaukee & St. Paul.—The earnings for October and for the four months ended Oct. 31 were reported as follows:

October:	1897.	1896.	Inc.
Gross earn	$3,579,847	$3,480,111	$99,736
Oper. expen	1,966,549	1,869,612	96,937
Net earn	$1,613,298	$1,610,499	$2,799
Four months:			
Gross earn	$2,284,752	$11,418,855	$865,897
Oper. expen	7,176 597	7,130,616	345,981
Net earn	$4,8 8,155	$4,288,239	$519,916

Chicago, Rock Island & Pacific.—The refunding plan of the Rock Island, which has been the subject of much talk, was announced on Tuesday of this week. It appears that Messrs. Speyer & Co., of New York City, have bought for a syndicate $52,000,000 of the new four per cent. 90 year gold bonds which are to be issued, the proceeds to be used for retiring the extension and collateral trust fives and the debentures, which are subject to call, as well as the Chicago & Southwestern sevens, due in 1909. The authorized amount of the new issue is $100,000,000. From the proceeds of this issue will be taken up the extension and collateral fives, $40,394,000, and the debenture fives, $4,500,000, both subject to call at 105. Also the Chicago & Southwestern sevens, $5,000,000 and $12,500,000 first mortgage sixes when they mature. The balance will be reserved for the purchase of new property. It is estimated that the saving in fixed charges, due to this transaction, will amount to about 1 per cent. on the capital stock. A special meeting of the stockholders has been called for Feb. 15 to authorize the issue, and immediately thereafter the syndicate will announce the call for payment of the extension and collateral fives at 105, and it is expected that this redemption will have been completed by June 1. About Sept. 1 it will be possible to redeem the debentures. Speyer & Co. will at their convenience make propositions to the holders of the Chicago & Southwestern sevens, maturing in 1899. The new bonds will be reckoned at 102½ or 103 in this operation.

Colorado Midland.—Holders of four per cent. consolidated mortgage bonds are notified that Dec. 20 has been fixed as the last day for the payment of assessments under the reorganization plan, as given in this column for Oct 1. Bondholders failing to pay assessments on or before that date will forfeit all rights under the reorganization.

Cumberland & Ohio.—An order of the Shelbyville Circuit Court in Kentucky has been issued for the public sale of the Northern Division of this road, which extends from Shelbyville, Ky., southwest 26.7 miles to Bloomfield. The Louisville & Nashville operates two trains daily to Bloomfield on this division. The other division of the road from Shelbyville to Anchorage is operated by the Chesapeake & Ohio to obtain an entrance to Louisville. The sale takes place under a mortgage of A. L. Schmidt, trustee, the total judgment being $492,152.

Delaware, Lackawanna & Western.—The earnings of the leased lines in New York for the quarter and nine months ended Sept. 30 were reported as follows:

Three months:	1897.	1896.	Dec.
Gross earn	$2,372,603	$2,461,715	$89,712
Oper. expen	1,075,701	1,158,311	82,610
Net earn	$1,296,302	$1,303,404	$7,102
Nine months:			
Gross earn	$5,184,357	$5,876,879	$692,512
Oper. expen	2,895 380	3,125,581	230,201
Net earn	$2 378.987	$2,841,298	$462,311

Detroit, Toledo & Milwaukee.—It is officially announced that the branch of the Chicago & West Michigan from Allegan, Mich., northwest 23 miles to Holland has been leased to the Detroit, Toledo & Milwaukee, the new company assuming control Dec. 1. (See this column for Sept. 17.) By this arrangement, the Detroit, Toledo & Milwaukee obtains an outlet from Allegan by way of Holland to Grand Haven, trackage rights being given by the Chicago & West Michigan from Holland.

Duluth & Iron Range.—The Minnesota State Railroad and Warehouse Commission has granted this company permission to increase its capital stock from $3,000 000 to $10,000,000. It is stated that this increase is for the improvements now in progress at the south end of the line, and for an extension from Ely, Minn., northeast 63 miles, to connect with the Port Arthur, Duluth & Western at Gunflint Lake.

Erie.—The earnings for October and for the 11 months ended Oct. 31 were as follows:

October:	1897.	1896.	Inc.
Gross earn	$3,269,293	$3,098,294	$170,999
Oper. expen	2,228,693	2,092,726	135,967
Net earn	$1,040,600	$1,005,568	$35 032
Eleven months:			
Gross earn	$29.923.698	$28.486,420	$1,437,278
Oper. expen	22,365,720	21,026 082	1,339,638
Net earn	$7,557,978	$7,460,338	$97.640

Evansville & Richmond.—Official notice is given that the name of this company has been changed to the Southern Indiana Railway Co., the change to take effect Dec. 1. The road extends from Elnora, Ind., east to Westport, 101.4 miles, and was sold under foreclosure at Washington, Ind., March 23, to the Farmers' Loan & Trust Co.

Houston & Texas Central.—The earnings for the year ended June 30, as shown by the annual report, were as follows:

Year:	1897.	1896.	Inc. or Dec.
Gross earn	$3 206,574	$3,143,305	I. $63,269
Oper. expen	2,174 140	2,107,541	I. 66,599
Net earn	$1,0 2,434	$1,035,764	D. $3,330

Lake Shore & Michigan Southern.—The earnings for the quarter ended Sept. 30 were reported as follows:

Three months:	1897.	1896.	Inc. or Dec.
Gross earn	$5,218,684	$5,025,536	I. $193,148
Oper. expen	3,185,397	3,122,795	I. 62,602
Net earn	$2,033,287	$1,902,741	I. $130,546
Other income	27,418	113 918	D. 86,500
Total income	$2,060,705	$2,016.659	I. $44 046
Charges	967,418	1,1 8.918	D. 151.500
Surplus	$1,093,287	$897,741	I. $195,546

Franklin & Megantic.—This road with all its equipment was sold by Sheriff Blake at Strong, Me., Nov. 23, to Weston Lewis, of Gardner, President of the Sandy River. The road extends from Strong to Kingfield, 15 mills. (See this column for Oct. 29.)

Kansas Pacific.—The government Directors and the Receivers of the Kansas Pacific, which is to be sold Dec. 15, have submitted to the Attorney-General the following statement of the gross and net earnings for the years from 1889 to 1896, inclusive, as follows:

Year:	Gross earn.	Net earn.	*Year:*	Gross earn.	Net earn.
1889	$3,055,000	$1,059,000	1893	$2,419,000	$802,000
1890	3,040,000	774,473	1894	2.093,000	609,289
1891	2,939,000	1,223.000	1895	2.018,000	609,000
1892	3,418,000	1,501,000	1896	2,248 000	705,000

Lake Shore & Michigan Southern.—Official announcement is made by the Detroit & Chicago Branch of this road that the property of that company, extending from Trenton northeast 27 miles to Dundee, Mich., has been sold to the Detroit & Lima Northern, and that possession was taken Dec. 1. (See this column under Detroit & Lima Northern for last week.)

Lebanon Springs.—It is reported that Receiver Elnathan Sweet will open this road in sections, the first being from New Berlin to Bennington, Vt., 25 miles. The road was closed to traffic on the night of July 30 on account of the unsafe condition of the tracks. The entire line extends from Chatham, N. Y., north 57 miles to Bennington, Vt.

Northern Central.—The earnings for October and for the 10 months ended Oct. 31 were as follows:

October:	1897.	1896.	Inc. or Dec.
Gross earn	$645,636	$655,250	D. $9,614
Oper expen	426,935	419,109	I. 7,826
Net earn	$218,701	$236,141	D. $17,440
Ten months:			
Gross earn	$5,531,677	$5,214,585	I. $316,492
Oper. expen	3,821,287	3,866,022	D. 34,735
Net earn	$1,699,790	$1,348,563	I. $351,227

Pennsylvania.—The earnings for October and for the 10 months ended Oct. 31 were reported as follows:

October.	1897.	1896.	Inc. or Dec.
Gross earn	$5,996,778	$5,596,878	I. $399,900
Oper. expen	3,820,878	3,539,278	I. 281,600
Net earn	$2,175,900	$2,057,600	I. $118,300
Ten months:			
Gross earn	$52,785,448	$51,657,948	I. $1,127,500
Oper. expen	35,878,535	36,888,735	D. 1,010,200
Net earn	$16,906,913	$14,769,213	I $2,137,700

Pittsburgh & Western.—It is reported that this company has decided to abolish service on the branch from Clarion Junction, Pa., to Clarion, a narrow gage section 6.2 miles in length. A new station, to be known as West Clarion, has been opened on the main line about 1½ miles from Clarion.

Philadelphia & Reading.—The earnings for October and for the four months ended Oct. 31 were as follows:

October:	1897.	1896.	Inc.
Gross earn	$2,184,454	$2,092,930	$91,524
Oper. expen	1,111,114	1,071,504	39,610
Net earn	$1,070,340	$1,018,426	$51,914
Coal and Iron Co	264,674	261,817	2,807
Reading Co	32,706	32,706	.....
Net all cos	$1,367,670	$1,312,949	$54,721
Fixed charges	745,000		
Surplus	$622,670		
Four months:			
Gross earn	$8,013,862	$7,474,520	$539,342
Oper. expen	4,258,739	4,100,617	158,122
Net earn	$3,755,123	$3,373,903	$381,220
Coal and Iron Co	620,072	498,169	121,903
Reading Co	119,840	119,840	.....
Net all cos	$4,495,035	$3,991,912	$503,123
Fixed charges	2,980,000		
Surplus	$1,515,035		

Priceville & Winton.—Judge Simonton, at Harrisburg, Pa., on Dec. 15, granted a decree of ouster against this road, which was chartered July 11, 1890, to build a line 49 miles long from a point on the Winton branch of the Delaware, Lackawanna & Western to a point 1,000 ft. south of the Lackawanna River, but has failed to begin work on the road. The company states that it has abandoned all intention of building.

Richmond, Nicholasville, Irvine & Beattyville.—This road, which was sold under foreclosure at Versailles, Ky., Oct. 11 (see this column for Oct. 22) has been sold a second time to a syndicate represented by Adolph Segar, of Philadelphia, the second highest bidder at the first sale, for $250,000, and it is reported that an extension will soon be made to Beattyville. The present road runs from Versailles, Ky., to Irvine, 61 miles.

St. Louis & San Francisco.—The earnings for October and for the four months ended Oct. 31 were reported as follows:

October:	1897.	1896.	Inc.
Gross earn	$684,551	$561,819	$122,732
Oper. expen	356,347	296,918	59,429
Net earn	$328,204	$264,901	$63,303
Four months:			
Gross earn	$2,453,461	$2,107,804	$345,660
Oper. expen	1,323,946	1,131,627	192,319
Net earn	$1,129,518	$976,177	$153,341

San Antonio & Aransas Pass.—The earnings for the year ended June 30, as shown by the annual report, were as follows:

Year:	1897.	1896.	Inc.
Gross earn	$2,208,418	$1,902,785	$305,633
Oper. expen	1,538,688	1,363,422	175,266
Net earn	$669,730	$539,363	$130,367

Sandusky, Mansfield & Norwalk.—Judge Wildman, at Sandusky, O., Nov. 30, appointed Judge Gardner, of Norwalk, O., and J. O. Moss, of Sandusky, Receivers of this road, which is a leased line of the Baltimore & Ohio, and extends from Norwalk to Newark, 116.25 miles.

Santa Fe, Prescott & Phœniz.—The earnings for the year ended June 30, as shown in the annual report, were as follows:

Year:	1897.	1896.	Inc.
Gross earn	$656,188	$584,208	$71,980
Oper. expen	313,241	278,652	34,589
Net earn	$342,947	$305,556	$37,391
Interest on bonds	338,144	304,095	34,049
Surplus	$4,803	$1,461	$3,342

Southern.—The earnings for October and for the four months ended Oct. 31 were follows:

October:	1897.	1896.	Inc. or Dec.
Mileage	4,827.22	4,776.63	50.59
Gross earn	$1,915,614	$1,896,706	I. $18,938
Oper. expen	1,200,207	1,156,565	I. 43,642
Net earn	$715,437	$740,141	D. $24,704
Four Months:			
Gross earn	$6,806,067	$6,454,616	I. $351,391
Oper. expen	4,607,320	4,361,033	I. 246,287
Net earn	$2,198,687	$2,093,583	I. $105,104

Saratoga & St. Lawrence.—This road, which since June 1, 1889, has been leased to the Ogdensburgh & Lake Champlain, a part of the Central Vermont, is now operated by the company under E. G. Reynolds, of Bombay, N. Y., one of the stockholders. The change was made at noon Nov. 17. The road extends from Moira, N. Y., north 8.5 miles to Bombay, and was leased at the rate of $3,500 a year.

Union Pacific.—Notice has been given that all securities held as collateral under the Union Pacific six per cent. collateral trust of 1891 will be sold at public auction at 111 Broadway, New York, at noon on Wednesday, Jan. 12, 1898. Each class of stock will be offered for sale in separate lots and later all will be sold in the aggregate. Bidders must deposit five per cent. of the amount of the bid before the sale, and upon acceptance of the bid must complete the amount to 20 per cent. of the face value of the securities.

William D. Cornish, Special Master, gives notice to holders of first mortgage bonds dated Nov. 1, 1865, that these bonds will be paid with maturing coupons at the office of the Mercantile Trust Co., of New York, on Jan. 20, 1898, and interest will cease after that date.

Wabash.—The earnings for October and for the four months ended Oct. 31 were reported as follows:

October.	1897.	1896.	Inc.
Gross earn	$1,305,010	$1,094,109	$210,901
Oper. expen	816,212	718,576	97,636
Net earn	$488,798	$375,533	$113,265
Four months:			
Gross earn	$4,839,183	$4,262,842	$576,341
Oper. expen	3,269,880	2,882,434	387,446
Net earn	$1,569,303	$1,380,408	$188,895

Wisconsin Central.—Judge Jenkins, at Milwaukee, Wis., has authorized the extension of the $2,000,000 Receivers' certificates until Nov. 15, 1898, with the interest reduced from six per cent. to five per cent. These certificates were issued in 1894, and were extended last year for one year.

Electric Railroad News.

Baltimore.—The banking house of Brown & Sons has purchased a controlling interest in the capital stock of the Union Traction Co., of Pittsburgh, amounting to about $16,000,000.

Brooklyn.—On a decision of Judge Andrews all work on the trolley loop at the New York terminus of the Brooklyn Bridge has been suspended and an appeal will be made to the Appellate Division of the Supreme Court. The railroad companies and Bridge Trustees are confident that the decision will be reversed. The Brooklyn Heights Co. is going ahead with the construction of the road, except on the loop at the New York terminal. Chief Engineer Martin states that if the proposed plan is dangerous it will be changed. The present injunction was secured by Mr. W. R. Hearst, Jr., of the New York *Journal*, presumably to create a sensation, inasmuch as the present plan cannot be conceived to be adverse to the public interests and a delay of the execution of the present plan means a considerable actual loss of money to the public.

Chicago.—Preliminary tests have been made with the cars equipped with the Sprague motors of the Metropolitan Elevated. Trains of three coaches are in regular service, and so far as we have heard, the tests have proved successful. The trains will be increased to five coaches, and the number of trains will increase as the cars are equipped.

At a meeting of the Chicago City Council on Nov. 22 an ordinance was unanimously passed providing that the street car companies must provide suitable protection to grip and motormen against the cold during the winter months. Neglect or refusal to comply with the ordinance will subject the companies to a penalty of not more than $50 nor less than $10 for each car and each day when the ordinance is violated.

The Chicago General Electric Co. has placed a double-deck street car in service which will be run regularly on Lawndale avenue. It has a seating capacity of 100.

Jersey City, N. J.—Judge McCarter, of Newark, on Saturday last decided against the Consolidated Traction Co., in the test case brought against it to collect a penalty for failure to comply with the law requiring vestibules on trolley cars from November to April, and Corporation Attorney Douglass states that he will institute suits against the Consolidated Traction Co., to recover the penalties prescribed by the law passed by the last Legislature. The penalty is $10 a day for each car. Suits will also be instituted against the North Hudson County Railroad for violation of the law. (For previous action see this column in issue of Nov. 12, page 808.)

Lancaster, Pa.—On Dec. 8 several large blocks of bonds of the Pennsylvania Traction Co. will be sold at public auction in Philadelphia.

Newcastle, Pa.—The strike of the employees of the Newcastle Traction Co. was settled Nov. 24, the men receiving a promise of securing 15 cents an hour, which is an increase of 20 per cent. over their present pay.

Norfolk, Va.—The Norfolk Central Railway Co. proposes to purchase 10 acres of undeveloped land in Westwood for the purpose of making a park, with the idea of increasing the passenger traffic on the electric road.

Philadelphia.—The Hestonville, Mantua & Fairmount Passenger Railway Co. has virtually passed into the hands of the Union Traction Co., the latter securing 25 shares of the stock of the former company. The Hestonville road will, however, be operated as an independent company. It secured its charter in 1859, and in 1865 was consolidated with the Fairmount Passenger Railway Co. The capital stock is $2,500,000 par. $50 full paid. The net earnings last year were $224,670 and it paid dividends to the amount of $65,170. Isaac Blum is President of the road.

Richmond, Va.—John L. Williams, of the firm of John L. Williams & Sons, bankers, of Richmond, writes us that on Nov. 22 the property of the Norfolk Railway Co. was transferred to his company and associates.

Staten Island, N. Y.—It is reported that the Staten Island Electric Railroad and the Midland Electric Railroad will soon be consolidated. The latter company runs through the interior of the island while the former company controls the lines running near the bay. Should the consolidation be perfected arrangements will be made for connection with the New York boats at the St. George's Ferry.

Terre Haute, Ind.—The Receiver of the Terre Haute Street Railway & Electric Light Co. has filed a report showing the total indebtedness to be $1,338,517. Nearly all of the bonds are held in New York and other eastern cities.

Troy, N. Y.—The stock of the Glens Falls, Sandy Hill & Fort Edward Railroad Co., formerly owned by Joseph A. Powers, of Lansingborough, and others, has been transferred to S. Pruyn, F. F. Pruyn and H. H. Pruyn. The stock sold includes the controlling interest in the road. No change in the control of the road is contemplated at present. The road was opened in 1885 and shortly after it was sold to capitalists of the villages through which it passed.

Watertown, N. Y.—The Watertown Consolidated and the Watertown & Brownville Street Railways were sold in foreclosure on Saturday last to satisfy a mortgage of $110,000 held by the Central Trust Co., of New York. The purchasers were Mayer Lebkuecher, of Newark, N. J., and C. T. Cornell, of New York, for $28,000 above the encumbrances.

TRAFFIC.

Traffic Notes.

The Detroit, Toledo & Milwaukee announces that hereafter its passenger trains will run through between Toledo and Grand Haven, using the track of the Chicago & West Michigan from Allegan to Grand Haven, 44 miles.

The Nebraska State Board of Transportation, after a protracted hearing, has ordered the railroads to restore carload rates for the transportation of live stock. These rates, long the subject of controversy, virtually ignore the weight of the load.

A Pullman tourist sleeping car is advertised to run once a week between New York and Chicago over the Erie road. It is "for the accommodation of passengers holding first or second class tickets to the Pacific Coast, or intermediate points, via Chicago and the Atchison, Topeka & Santa Fe." The rates for berths are $8 to the Pacific Coast, $3 to Kansas City and $2 to Chicago.

The Erie has made a contract with the Fall Brook Railway, by which the freight trains of the Erie will run over the Fall Brook road between Corning, N. Y., and Newberry Junction, Pa., 110 miles. By this extension the Erie will make direct connection with the Philadelphia & Reading, affording a favorable route for anthracite coal to the West.

Reports from Buffalo state that the canal season now closed has been the worst season on record except 1895. The wheat shipments this season reached 25,964,172 bushels, a decrease of 11,000,000 bushels compared with last year, but an increase of 5,000,000 bushels over 1895. The average rate of freight on wheat to New York was 2,8 cents, compared with 3.7 cents last year, and 2.2 cents in 1895.

The State Railroad Commissioners of Texas have denied the application of the Missouri, Kansas & Texas for authority to concentrate cotton, for compression, at certain stations. It is said that this application is a part of a plan for introducing the round bale process of compression and that the aim of the railroad company was to secure privileges which would materially injure the business of the old established cotton presses.

A press dispatch of Nov. 30 states that a contract has just been signed for the shipment of large quantities of Nova Scotia coal to Boston. The New England Gas and Coke Company, composed of W. L. Elkin, Philadelphia; Hollister & Babcock, New York; Messrs. Rockefeller, Rogers, H. M. Whitney and others, has signed an agreement with the Dominion Coal Company for the delivery of 800,000 tons of coal yearly in Boston, with the right to receive 1,500,000 tons at the same figure. The contract is for a long term, said to be 20 years, and will double the output of the mines.

Chicago Traffic Matters.

CHICAGO, Dec. 1, 1897.

Colorado freight rates on Wednesday last again fell a notch, the cut bringing the first-class rates down from $1.19. This was the fourth reduction in these rates made inside of two weeks. The tariff announced from Chicago and applying to Denver, Pueblo, Colorado Springs and Trinidad is as follows:

Class	1	2	3	4	5	A	B	C	D	E
Rate	1.03	82	45	32	27	32	27½	25	25	25

Early this week the lines via the Gulf announced a still further cut which, if met by the Western roads, will bring the first-class rates from Chicago to Colorado points down to 87 cents. The regular tariff from this city to the Missouri River is 80 cents, so the Colorado war is now sure to affect the territory east of the river.

Trouble over passenger rates between Chicago and St. Paul and Minneapolis continues to be a subject of live interest in this section. Following the cut announced last week, when the rate was slashed from $11.50 to $8, the warring roads have forced the rate still lower, the last figure being $7 with a strong probability of its going to $5.

A committee made up of the five commissioners of the Western Joint Traffic Bureau has placed before the Western roads a recommendation to stop the abuse of drovers' passes by wholly abolishing free return tickets. The committee made a careful investigation of the reported abuses at Kansas City, Omaha, St. Paul, Chicago and St. Louis, and it was shown that on the basis of one man with every three cars, which is a conservative estimate under the present rules, the total number for which round trip transportation was last year obtained was not less than 163,000 persons. During the first 10 months of 1897, with a total of 12,330 cars forwarded from Kansas City, there were passed free 317 owners, 196 bona fide employees and 913 deadheads.

Eastbound shipments from Chicago and Chicago junctions to points at and beyond the western termini of the trunk lines for the week ending Nov. 25 amounted to 55,964 tons, as compared with 59,591 tons the preceding week. This statement includes 13,915 tons of grain, 2,074 tons of flour and 12,829 tons of provisions, but not live stock. The following is the statement in detail for the two weeks:

Roads.	Week Ending Nov. 25.		Week Ending Nov. 18.	
	Tons.	p. c.	Tons.	p. c.
Baltimore & Ohio	4,984	8 9	5,180	8.7
C., C., C. & St. Louis	4,086	7.3	3 847	6 5
Erie	7,501	13.4	7,410	12 4
Grand Trunk	3,226	5.8	3,176	5 3
L. S. & M. S	5,054	9.	4,431	7.4
Michigan Central	7,890	14 1	5,270	8 9
N. Y., Chi. & St. L	4,890	8 7	6,483	10.9
Pitts., Cin., Chi. & St. Louis	6,270	11.2	8,487	14 2
Pitts., Ft. Wayne & Chicago	8,599	15.4	11,860	19 9
Wabash	3,464	6.2	3,447	5.8
Totals	55,964	100.0	59,591	100.0

Lake shipments last week were 106,862 tons.